

The Armagh Observatory and Planetarium

**Annual Report and
Accounts** for 2009/2010
Year Ended 31 March 2010



The Armagh Observatory and Planetarium Annual Report and Accounts for 2009/2010, Year Ended 31 March 2010

The Accounting Officers authorized these financial statements for issue

on

25 August 2010

*Laid before the Northern Ireland Assembly by the Department of Culture, Arts and Leisure
under clause 8 of the Armagh Observatory and Planetarium (Northern Ireland) Order 1995
as amended by Schedule 1, clause 6 of the Audit and Accountability (Northern Ireland) Order 2003*

23 September 2010

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Management Commentary

Background

The Armagh Observatory and the Armagh Planetarium are distinct institutions, part of a single statutory corporation and arms-length body 'The Governors of the Armagh Observatory and Planetarium' described in the Armagh Observatory and Planetarium (Northern Ireland) Order 1995. This superseded the original 1791 Act of the Irish Parliament entitled 'An Act for Settling and Preserving a Public Observatory and Museum in the City of Armagh For Ever', and an Amendment of 1938 ('The University and Collegiate and Scientific Institutions Act [Northern Ireland], 1938'). The Northern Ireland Order 1995 has since been amended by the Audit and Accountability (Northern Ireland) Order 2003, the Insolvency (Disqualification from Office: General) Order (Northern Ireland) 2008 and a number of other amendments.

The Armagh Observatory is also a recognized charity, having been granted charitable status for tax purposes by Her Majesty's Revenue and Customs (HMRC) under Section 505 of the Income and Corporation Taxes Act 1988; the HMRC reference number is XN 46022. The principal function of the Observatory, founded in 1789 as part of Archbishop Richard Robinson's dream to see the creation of a university in the City of Armagh, is to undertake original research of a world-class academic standard that broadens and expands our understanding of astronomy and related sciences.

The Armagh Planetarium, which is also a recognized charity (HMRC reference number XN 48022), was founded by Dr Eric Mervyn Lindsay, the seventh director of the Armagh Observatory, and was officially opened on 1st May 1968. The Planetarium's primary function is to disseminate knowledge of a wide range of science and to promote public understanding of astronomy and science through its programme of educational services for schools and the wider public. The two sides of the corporation operate under two directors and receive core funding from the Department of Culture, Arts and Leisure. There is a total complement of on average 39 staff and students excluding academic visitors and affiliated academic staff and students, 29 in the Observatory and 10 in the Planetarium.

Aims and Objectives

The aim of the corporation is to advance the knowledge and understanding of astronomy and related sciences through the execution, promotion and dissemination of astronomical research nationally and internationally in order to enrich the intellectual, economic, social and cultural life of the community.

Principal Activities

The principal function of the Armagh Observatory is to undertake original research of a world-class academic standard that broadens and expands our understanding of astronomy and related sciences.

The Observatory carries out front-line astronomical research in three key areas of astrophysics, namely: Solar-System Science, Solar Physics, and Stellar and Galactic Astrophysics. These fields encompass the dynamical structure, evolution and origin of objects in the inner and outer solar system; comparative planetology and meteor physics; the use of spacecraft such as SoHO, TRACE and Hinode, to study fundamental questions such as how the Sun's outer atmosphere is heated, what drives the solar wind and the Sun's variable magnetic activity (and its effect on climate); and a very wide range of detailed investigations into the formation and evolution of stars, taking into account factors such as mass loss through stellar winds, stellar oscillations, stellar magnetic fields, extreme chemical abundances, and the impact of binarity (two stars orbiting closely around one another) on our understanding of the evolution of stars and galaxies. In particular, our multi-strand multi-wavelength approach to the discovery of ultra-compact binaries will provide crucial input for understanding the first detected gravitational wave events.

In addition, the Armagh Observatory undertakes an active programme of Science in the Community encompassing education, lifelong learning and public understanding of science. In the past, projects have included construction of the Human Orrery (the first such exhibit in the world to be laid out with precision) and the creation of the first International Phenology Garden in Northern Ireland, which is closely linked to European and Cross-Border phenology projects and to the Observatory's own unique climate record. The Observatory has also played a leadership role in the Armagh Visitor Education Committee (AVEC), particularly in arrangements for the second Armagh Heritage Day "Robinson's Legacy to Armagh", and editing the proceedings of this and the previous year's heritage day into a book "Border Heritage: Tracing the Heritage of the City of Armagh and Monaghan County" that was launched and published in June 2008 by TSO (The Stationery Office; see <http://www.tsoshop.co.uk/>).

During 2009, the Observatory significantly expanded its programmes of Science in the Community by playing a leading role in the International Year of Astronomy (IYA 2009) and contributing to the all-Ireland IYA 2009-Ireland programme as well as the corresponding British programme. This expanded outreach activity included the provision of additional guided tours of the Observatory and its Grounds, Astropark and Human Orrery, the organization of special public lectures and exhibitions, the delivery of an outreach programme to schools, and supervision of school children and undergraduates on work-experience programmes and summer research projects.

The programmes of Science in the Community highlight the strength of international astronomical expertise in Armagh and help to explain to a wider audience the very active research programmes in astronomy and related sciences that are and have been undertaken in Armagh. The Observatory is an international research institute that makes a major contribution to promoting the City of Armagh

and Northern Ireland on the world stage. It attracts a high level of media interest (e.g. in recent years more than 400 mass-media citations to its work per year); its web-sites attract nearly a million distinct e-visitors (DEVs) annually from around the world; and approximately 50,000 people visit the landscaped Grounds and Astropark every year, a unique inner-city parkland designed to enrich the lives of residents and visitors to Armagh alike.

In addition to this primary research role the Observatory maintains a unique nearly 215-year long meteorological record and data-bank (<http://climate.arm.ac.uk/>), believed to be the longest daily climate series in the UK and Ireland from a single site. The climate station has been continuously maintained since 1795, with readings currently taken every day at 09:00 (GMT). Calibration of these data has enabled researchers and government agencies to use the Armagh series for reports and research into global warming. This is a subject of strategic importance for Northern Ireland as we move into an era of rapid climate change. The Armagh Observatory's climate record provides a long historical baseline against which to judge how Northern Ireland's climate is responding to climate change world-wide.

The Observatory also has an important responsibility to maintain and preserve the fabric of the historic buildings, the library, historic books and archives, and the collection of scientific instruments and other artefacts built up over 220 years of continuous astronomical activity in Armagh. The main historic buildings of the Observatory have unique architectural features and house a valuable library, archives and museum collection that contains a growing collection of historic books and manuscripts and a wide range of astronomical images and photographic plates, scientific instruments, clocks and other artefacts concerning the development of astronomy at Armagh over more than two hundred years.

The Observatory's heritage policy is to progressively restore the historic buildings and scientific instruments in its possession, where possible placing the restored material close to its original location in the main Grade A listed building. The objective has been to maintain the integrity of the Library and Archives as a coherent entity for future generations in the City of Armagh and to preserve this historic material and improve the security and environment in which it is held. The Observatory also seeks to widen access to this material so that visitors, or visitors to the Observatory's web-sites and researchers and others who may use the Observatory's facilities will be able to appreciate more clearly the context in which the now historic material was first used. This helps to maintain a rich educational, scientific and cultural resource, highlighting the Observatory's position as Northern Ireland's oldest scientific institution.

During the past 25 years a number of important heritage projects have been completed with support from government and other funding agencies. More recent work completed in the last decade has included digitization of the meteorological and climate archive for scientific use, a programme supported by the Heritage Lottery Fund (HLF) and the Irish Sailors and Soldiers Land Trust; and a project to conserve and restore the remaining historic telescopes and telescope domes and to restore the windows and other features of the historic main building. It is planned to progress another phase of this programme of restoration and conservation, namely the construction of a new Library, Archives and Historic Scientific Instruments building, to house and provide exhibition space for the Museum, Library and Archives collections and to provide additional space for the academic staff. A further project is to improve the quality of conservation and collections management of the material held in the Library and Archives.

The Armagh Planetarium is a leading educational establishment whose primary function is to disseminate knowledge of a wide range of science and to promote the public understanding of astronomy and science through its programme of educational services for schools and the wider public. Staff deliver interactive presentations using the latest projection and information technology to all age groups and abilities on a wide range of astronomical and scientific topics, including meteorite impacts, the planets, current astronomical phenomena and Earth sciences. The Planetarium, also through the large number of visitors coming through its doors, plays an important role in promoting and enhancing tourism within Armagh City and District.

Equal Opportunities Policy

The corporation is an equal opportunities employer, committed to ensuring that the talents and resources of all members of the corporation are utilised to the full. The corporation does not discriminate directly or indirectly on the grounds of religious belief, political opinion, trade union membership, gender, marital status, sexual orientation, age, disability, race, colour or ethnic origin, against any member of staff, full-time or part-time, or job applicant, actual or potential, in any aspect of the corporation's activities, including matters of recruitment, training, promotion, appointment, nomination or selection for any position, job transfer or redundancy.

Policy on Payment of Suppliers

The corporation is committed to the payment of all invoices not in dispute within agreed contractual terms. The corporation also recognizes the importance of paying invoices received as soon as possible and does everything practically possible to meet the 10-day prompt payment target in the Accounting Officer guidance DAO 12/08 issued by the Department of Finance and Personnel. In the seven month period from 1 September 2009 to 31 March 2010, the latest available dataset, the average time taken to pay invoices not in dispute was 12.1 days.

Auditors

Under the Audit and Accountability (Northern Ireland) Order 2003, responsibility for the audit of the accounts of the Armagh Observatory and Planetarium has been vested in the Comptroller and Auditor General for Northern Ireland.

Employee Information and Consultation

The corporation takes every opportunity to inform and consult with all members of the organisation on the corporation's activities and plans for the future through the dissemination of annual reports and operational plans, the provision of the latest information on research, educational and other activities through the web-sites, regular formal and informal briefing and discussion meetings, and consultations with staff representatives on employment-related and operational policies and procedures.

Further information on the Observatory is available at <http://star.arm.ac.uk/> and <http://climate.arm.ac.uk/>, and on the Planetarium at <http://www.armaghplanet.com>.

Corporate Governance

Board of Governors

The Board of Governors comprises the Church of Ireland Archbishop of Armagh (Chairman), the Dean and Chapter of the Church of Ireland Cathedral of Armagh (9 persons), 1 DCAL nominee, 1 Queen's University Belfast (QUB) nominee, and up to 3 additional members nominated by the Board of Governors. Nominees normally serve for an initial period of 5 years with the possibility of extension.

Chairman: His Grace, The Most Reverend A.E.T. Harper, The Archbishop of Armagh and Primate of All Ireland
The Dean: The Very Reverend Dean P.W. Rooke, St. Patrick's Cathedral, Armagh
The Precentor: The Reverend Canon T. Scott, also Rector of Magherafelt
The Chancellor: The Reverend Canon C.F. Moore, also Rector of Newtownhamilton, Ballymoyer and Belleek
The Treasurer: The Reverend Canon J.W. McKegney, also Rector of St. Mark's Parish, Armagh
The Archdeacon: The Venerable R.G. Hoey, also Rector of Camlough and Mullaglass
The Prebendary of Mullabrack: The Reverend Canon W.J.A. Dawson, also Bishop's Curate of Pomeroy
The Prebendary of Ballymore: The Reverend Canon R.J.N. Porteus, also Rector of Derryloran Parish (Cookstown)
The Prebendary of Loughgall: The Reverend Canon J.N.T. Campbell, also Rector of St. Mark's Parish, Portadown
The Prebendary of Tynan: The Reverend Canon W.M. Adair, also Rector of St. Columba's Parish, Portadown
Councillor W. Gardiner-Watson (DCAL Nominee)
Professor A. Hibbert, Queens University Belfast (QUB Nominee)¹
The Right Honourable the Lord Ballyedmond, Ballyedmond Castle, Rostrevor (Board of Governors Nominee)
Dr R.D. Oudmaijer, University of Leeds (Board of Governors Nominee)

Management Committee

The Management Committee comprises the Church of Ireland Archbishop of Armagh or his nominee (Chairman), 3 Nominees from the Board of Governors, 6 DCAL nominees, 1 QUB nominee, 1 Science and Technology Facilities Council (STFC) nominee, 1 Dublin Institute for Advanced Studies (DIAS) nominee, and currently 2 additional members co-opted by the Board of Governors. Nominees and those co-opted by the Governors normally serve for an initial period of 3–5 years with the possibility of extension.

Chairman: His Grace, The Most Reverend A.E.T. Harper, The Archbishop of Armagh and Primate of All Ireland
Deputy Chairman: Dr F.N. Byrne (Co-opted, Board of Governors)
Professor A. Hibbert, Queens University Belfast (Co-opted, Board of Governors)²
The Venerable Archdeacon R.G. Hoey, Camlough and Mullaglass (Board of Governors Nominee)
Dr R.D. Oudmaijer, University of Leeds (Board of Governors Nominee)
Mr E.P. Donnelly (DCAL Nominee)
Dr E.M. (Á.) Downey (DCAL Nominee)³
Mrs S. Hogg (DCAL Nominee)
Mr A. Peoples (DCAL Nominee)
Mr J.I. (S.) Shields (DCAL Nominee)
Mrs P.E. Wilson (DCAL Nominee)
Professor P.L. Dufton, Queens University Belfast (QUB Nominee)
Professor M.R. Merrifield, University of Nottingham (STFC Nominee)
Professor T.P. Ray, Dublin Institute for Advanced Studies (DIAS Nominee)

Audit and Risk Management Committee

The Internal Audit Committee, a sub-committee of the Management Committee, comprises Dr F.N. Byrne (Chairman), Dr E.M. (Á.) Downey⁴, Professor P.L. Dufton, Professor A. Hibbert, Mrs S. Hogg, and Mr A Peoples⁵.

Directors and Secretary

Professor M.E. Bailey MBE MRIA — Director, Armagh Observatory
Dr T.R. Mason MBE — Director, Armagh Planetarium
Mr L.F. Young — Secretary

¹ To 30 September 2009

² From 1 October 2009

³ To 22 October 2009

⁴ To 22 October 2009

⁵ To 25 September 2009

The Armagh Observatory — Operating Review 2009/2010

The following research results, performance indicators for 2009/2010, and objectives for 2010/2011 are extracted from the Armagh Observatory Annual Report for Calendar Year 2009 (Financial Year 2009/2010), which contains an extensive summary of the whole of the Observatory's principal research and other activities during 2009. The full report is available at <http://star.arm.ac.uk/annrep/> or by contacting the Administrator at the Armagh Observatory, College Hill, Armagh, BT61 9DG, tel. +44-28-3752-2928; e-mail: info@arm.ac.uk.

Alignment with Northern Ireland Government Objectives

Astronomy is part of world heritage and an important part of the shared heritage of people living on the island of Ireland. The Armagh Observatory is Northern Ireland's oldest scientific institution, and Northern Ireland government support for astronomy at Armagh is central to the mission of the Department of Culture, Arts and Leisure (DCAL) "to protect, nurture and grow Northern Ireland's Cultural Capital for today and tomorrow." In return, astronomers at Armagh make distinctive contributions to major strands of government policy and project a key part of Northern Ireland's cultural and scientific heritage to millions of people world-wide.

Shared Heritage There is a very significant public interest in astronomy and space science, and related fields. The interest is mirrored by the Observatory's academic focus and addressed by its very active programmes of public outreach and public understanding of science. Astronomical research makes a fundamental contribution to knowledge, and helps to attract people — both young and old — towards science and into a more scientific way of thinking. Science, in Carl Sagan's phrase, is "a candle in the dark"; and astronomy — foremost amongst sciences — helps people to make sense of their place in the world and the wider world around us.

The International Year of Astronomy 2009, supported by the United Nations, the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the International Astronomical Union (IAU), provided an opportunity to showcase many important discoveries of astronomy. It also served to stimulate even greater public interest in astronomy and its scientific and cultural impact, and especially highlighted the role of astronomy as a component of world heritage. It is noteworthy that the IAU and UNESCO have signed a Memorandum of Understanding to develop and expand these thematic links between astronomy and world culture as part of the UNESCO's World Heritage Initiative (see <http://whc.unesco.org/en/astronomy>). In the same way the heritage of astronomy within Northern Ireland, stretching back thousands of years, provides important thematic links to core functions of the Department of Culture, Arts and Leisure (DCAL). These links highlight the importance of maintaining the momentum of the Observatory's programmes of Science in the Community during 2009, and of building on the success of IYA 2009.

We particularly draw attention to the growing interest, nationally and internationally, in identifying ways to reduce light pollution: partly to avoid the waste of energy used to illuminate outer space (e.g. through sky glow, light trespass and light waste), but also, irrespective of the energy argument, because it is recognized that light pollution has many other adverse environmental consequences. Furthermore, people's responses, even today, to an uninterrupted view of a really clear, dark night sky, illustrate the impact of astronomy on culture and underline the powerful astronomical influences that have affected — equally up to now — the development of every civilization and society on Earth. Astronomy is a key part of the shared heritage of people who live on the island of Ireland and a central element of culture: in the words of Jean Perrin (1870–1942), "What would human thought have achieved if we could not see the stars?"

Research Staff at the Armagh Observatory have maintained a high level of research activity and other outputs during the year, producing 41 publications in refereed scientific journals during 2009 as well as many other scientific papers and attracting a record 442 identified mass-media citations to the Armagh Observatory, its staff and their work. Electronic access to the Armagh Observatory has also remained at a very high level. During 2009 there were more than 900,000 Distinct e-Visitors (DEVs) to the Observatory's principal web-sites (<http://star.arm.ac.uk/>, <http://climate.arm.ac.uk/> and <http://arpc65.arm.ac.uk/~spm/>), 15.5 million 'hits', and a record 7.8 TB (1 TB = 1 million Megabytes) of data were exported from the Armagh Observatory to users of astronomical information elsewhere. In addition, the web-site <http://astronomy2009.ie/> set up and maintained by Miruna Popescu to provide a separate record of all-Ireland International Year of Astronomy activities during 2009 received 92,000 DEVs, 2.8 million 'hits' and exported 67 GB of data to users elsewhere from 1 July 2008 to 31 December 2009.

During 2009, Armagh Observatory staff delivered approximately 115 scientific papers and general public talks at meetings both locally and abroad, and maintained an active programme of in-house training including 37 internal seminars and colloquia, most of which were delivered by external visiting speakers.

Total external grant receipts and other income during 2009/2010 amounted to £356,654 (2008/2009: £254,279), of which £346,733 (2008/2009: £242,772) was attributable to external grant receipts. This figure, which exceeded the anticipated figure in the 2009/2010 Business Plan (£273,400), highlights the success of Armagh Observatory staff in proactively obtaining externally funded, peer-reviewed research grants in a difficult financial climate.

Presenting Northern Ireland on the International Stage The Armagh Observatory provides a strong, positive image of Northern Ireland on the international stage. Members of staff play a full role in the international astronomical community, for example assessing grant and research proposals on behalf of external funding agencies; reviewing scientific papers; editing international academic journals; and serving on the committees of bodies such as the Science and Technology Facilities Council (STFC), the Royal Astronomical Society and the Royal Irish Academy. During 2009, staff at the Armagh Observatory significantly expanded the Observatory's programme of Science in the Community in response to the International Year of Astronomy 2009 (IYA 2009) by

providing additional guided tours of the Observatory and Astropark, holding special public lectures and exhibitions, delivering an outreach programme to schools, and supervising school children and undergraduates on work-experience programmes and summer research projects. The Observatory Grounds, Astropark and Human Orrery were also developed as a unique facility to enrich the lives of visitors to Armagh and residents alike. Partly as a result of this activity, the number of visitors to the Astropark increased during 2009: the counter at the entrance to the 'Solar System' part of the Astropark registered approximately 55,000 visitors, some 10,000 more than the 2008 figure of around 45,000.

Research Environment The Observatory's computer facilities are used primarily for numerical analysis, computer modelling and data reduction; the computers and peripherals are largely funded by the DCAL, but occasionally by external research grants, for example those funded by the STFC or PRTLI. Staff have access to a number of iMac workstations, approximately 40 Linux workstations and peripherals, a number of portable computers, and a computer cluster comprising 25 dual-processor work nodes and one master node with a total of 50 GB of memory. This is used for computationally intensive research projects in observational and theoretical astrophysics (including data reduction and modelling) in areas such as solar physics, stellar atmospheres, stellar winds, radiation hydrodynamics, numerical magneto-hydrodynamics, and solar-system dynamics.

The internal network is a 1 Gbps backbone ethernet linked with switched hubs. The external network is connected to the Joint Academic Network (JANET) through a dedicated 100 Mbps link provided through the Observatory's participation in the Northern Ireland Regional Area Network (NIRAN). The Armagh Observatory has access to high-performance supercomputing at the Irish Centre for High-End Computing (ICHEC) as well as advanced training programmes.

The Observatory's suite of technical equipment is complemented by a Library and Archives that is one of the premier specialist collections of its kind in the UK and Ireland. The library, archives and museum collection together contain a unique and growing collection of historic books and manuscripts, as well as images, photographic plates, scientific instruments, clocks and other artefacts concerning the development of astronomy in the UK and Ireland over more than two hundred years.

The meteorological archive contains the longest continuous daily climate series from a single site in the UK and Ireland. The climate station has been continuously maintained since 1795, with readings currently taken every day at 09:00 (GMT). Calibration of these data has enabled researchers and government agencies to use the Armagh series for reports and research into global warming. This is a subject of strategic importance for Northern Ireland as we move into an era of rapid climate change. The Armagh Observatory's climate record provides a long historical baseline against which to judge how Northern Ireland's climate is responding to climate change world-wide.

Armagh Observatory staff also have access to world-class international facilities that are provided through STFC and UK Government subscriptions or bilateral agreements and collaborations involving individual Armagh Observatory research staff. Observatory staff regularly obtain telescope time on national and international facilities such as the ESO Very Large Telescope (<http://www.eso.org/outreach/ut1fl/>) and various spacecraft missions (such as SoHO, TRACE, Hinode, XMM-Newton, and the Hubble Space Telescope). They obtain research grants from a wide range of grant awarding bodies (e.g. the STFC, the Royal Society, the Leverhulme Trust, British Council etc.), and through the Observatory's membership of the UK SALT Consortium (UKSC) have access to the 11-metre diameter Southern African Large Telescope (SALT; see <http://star.arm.ac.uk/SALT/>), located at the Sutherland Observatory, South Africa. Complementing these international facilities, restoration of the Observatory's historic telescopes has brought opportunities to reintroduce some visual observing from Armagh, while new computer and camera technology has enabled a variety of new automatic observational programmes to be introduced from Armagh, recording data autonomously whenever the sky is clear.

Principal Achievements During 2009 and 2009/2010

Advances in Astronomy and Astrophysics

Meteor Astronomy Apostolos Christou and Simon Jeffery report that the Observatory's meteor patrol cameras and the Polar Bear Survey Telescope both recorded a bright fireball around 00:57 (UT) on the morning of 22 November 2009. The meteor's speed was estimated as approximately 25 km s^{-1} and its size before atmospheric entry is believed to have been about the size of a small apple. The object's speed and the way that it fragmented as it finally burned up in the Earth's upper atmosphere are suggestive of a cometary source. The image of the fireball obtained by the Polar Bear Survey Telescope is one of the best such images ever recorded, showing detail with an effective resolution at the height of the fireball of approximately 50 metres. It is likely that additional serendipitous co-detections of meteors await discovery in the meteor patrol and Polar Bear archives, providing a unique opportunity to study at high spatial resolution the evolution and final fate of meteoric material deposited in the upper atmosphere.

Mutual Events of the Satellites of Jupiter Apostolos Christou reports his ongoing analysis of three eclipses of the small Jovian satellite Amalthea by the Galilean satellites of Jupiter. He also notes that he and John McFarland observed an occultation of Galilean satellites of Jupiter using telescopes at the Observatory between 19:45 and 20:00 (UT) on the evening of 30 November 2009. In this case, Europa occulted (i.e. passed in front of) Io.

The technique of mutual-event astrometry yields very precise astrometric positions of planetary satellites and it has typically been applied to the classical satellites of Jupiter, Saturn and Uranus. The eclipse of Amalthea by Europa is the first time that it has been applied to one of the small, faint satellites that orbit their primary well within the orbits of the larger, classical moons.

In this case, the observations were obtained in 2009 using the two 2.0 m Faulkes telescopes (one in Haleakala, Maui, Hawaii, and the other in Siding Spring, Australia), which now form part of the Las Cumbres Observatory Global Telescope Network. A fit to a model based on the predicted relative position of Amalthea relative to the eclipsing Galilean satellite Europa reveals that Amalthea is slightly 'early', i.e. the eclipse took place a few seconds ahead of the prediction. This corresponds to a positional offset of about 100 km along its orbit. The satellite's current along-orbit ephemeris uncertainty, based on ground-based and spacecraft observations, is approximately 400 km (http://ssd.jpl.nasa.gov/?sat_ephem). Christou plans follow-up observations on these results by leading a campaign to observe additional events during the 2014–2015 Jovian mutual-event season.

Stellar Occultation by Jupiter Apostolos Christou also reports on a successful observation of the occultation of the star 45 Cap ($V = 6.0$) by Jupiter on 3 August 2009 from four sites in Greece. The aim of this effort, which was part of a world-wide observing campaign organized by the European Section of the International Occultation Timing Association (IOTA: <http://www.iota-es.de>), was to retrieve the basic parameters of the dynamic jovian atmosphere at heights corresponding to a pressure range between 1 and 100 microbar. These levels are not typically amenable to study by other types of ground-based observations or *in situ* measurements.

Preliminary inspection of the data by Christou has revealed the presence of rapid variations in stellar intensity ("flashes") during both ingress and egress, indicative of layering in the Jovian mesosphere. This work strengthens the Observatory's position to lead similar occultation campaigns in the future.

Solar Physics Visiting astronomer Maria Madjarska has led a successful team at the International Space Science Institute (ISSI), Bern, and is involved in several international research collaborations with research staff at Armagh. In one study "Explosive events associated with a surge", which involves a collaboration with Gerry Doyle (Armagh) and B. de Pontieu (Lockheed Martin Solar and Astrophysics Laboratory, Palo Alto, USA), she notes that the solar atmosphere contains a wide variety of small-scale transient features. They have explored for the first time the interrelation between some of these features, notably surges (relatively cold 10,000 K jets in active regions) and explosive events (seen only with a slit spectrometer in the form of high-velocity Doppler-shift events up to 250 km s^{-1}) using simultaneous spectral and imaging data.

The features were observed with space and ground-based instruments that can detect solar plasma with temperatures ranging from 10,000 K to 1 MK. The alignment of all these data in time and solar latitude and longitude shows that spectral line profiles that are attributed to explosive events are in fact due to a surge phenomenon. The surge's up and down-flows, which often appear simultaneously, correspond to the blue and red-shifted emission of transition-region spectral lines (up to 300,000 K) as well as radiance increases in chromospheric spectral lines (~10,000 K). Some parts of the surge are also visible as flows in imager data (~1 MK) which could suggest heating to coronal temperatures.

This study demonstrates that the division of small-scale transient events into a number of different subgroups, for instance explosive events, blinkers, spicules, surges or just brightenings, is ambiguous, and implies that the definition of a feature based only on spectroscopic or imaging characteristics, with insufficient spectral and spatial resolution, can be incomplete.

Pulsed Radio Emission from Ultracool Dwarfs Gerry Doyle reports that in recent years very low mass stars and brown dwarfs (collectively termed ultracool dwarfs) have unexpectedly been confirmed as a new class of radio source. The extraordinary characteristics of this radio emission, particularly the periodic presence of 100% circularly polarized pulses, are proving difficult to explain, and there is still no scientific consensus as to their ultimate cause.

The pulses are believed to be due to narrowly beamed electron cyclotron maser (ECM) emission, the same kind of radio emission detected at kHz and MHz frequencies from the magnetized planets in our solar system, but requiring much more powerful — kilogauss — magnetic fields. Doyle and colleagues have conducted observations of the spectral class M9 ultracool dwarf TVLM 5134–6546 on three successive nights using the Wide-band Arecibo Pulsar Processor (WAPP) on the Arecibo dish, spanning the frequency range 4300–5300 MHz. The data have yielded dynamic spectra of the periodic pulses showing a high degree of variability in the brightness of individual pulses over the course of the observation campaign. The brightest pulsed emission had a flux density in excess of 20 mJy, the strongest radio emission yet detected from an ultracool dwarf.

Photometric Follow-up of Transiting Extrasolar Planets PhD student Tobias Hinse has been involved with the MiNDSTEP collaboration using the ESO/La Silla Danish 1.54 m telescope, in addition to his main PhD work on the dynamics of irregular satellite systems in planetary systems. The additional work involves obtaining detailed photometric follow-up observations of transiting exoplanets — stellar systems in which the planet is observed to cross the face of the star, which although unresolved leads to a measurable diminution of starlight which can be used to help constrain the properties of the exoplanetary system.

Reduction of Polarimetric Data Stefano Bagnulo reports that he and collaborators have carried out an extensive investigation of polarimetric techniques, showing how to maximize the efficiency of polarimetric observations and the accuracy of the associated data reduction. The work illustrates a general — but often overlooked — 'problem' with astronomical data, namely how properly to interpret astronomical observations (e.g. removing particular instrumental effects and calibrating the resulting outputs) in order to obtain reliable results that can be used as a basis for physical modelling. The problem is particularly severe in the interpretation of polarimetric observations, where sub-optimal procedures can sometimes produce spurious results.

In particular, Bagnulo and colleagues have developed an automatic reduction procedure that allows stellar magnetic field measurements to be determined from circular polarization data. The technique can be applied to data obtained with the FORS1 instrument of the European Very Large Telescope (VLT), a photometric archive that includes more than a thousand observations of several hundred stars obtained using approximately 1,000 hours of this giant 8-metre diameter telescope. The results will provide a

large database of stellar magnetic field measurements reduced in a fully consistent and homogeneous way. Preliminary results, presented at a workshop in Paris, have shown that several apparent detections of stellar magnetic fields in the past are in fact spurious, i.e. were the result of an erroneous data reduction procedure. This project will lead to significant improvement in our knowledge of the statistical incidence of magnetic fields in several classes of object.

Ultra-Compact Binaries Gavin Ramsay reports multi-wavelength observations of the ultra-compact binary (UCB) KL Dra which has revealed that it goes into outburst every 60 days. This is significant since it is the first UCB to show outbursting behaviour similar to that shown by dwarf novae. In contrast to dwarf novae, UCBs are composed mainly of helium and not hydrogen. Observations carried out using the *Swift* satellite showed that while KL Dra brightened at ultra-violet wavelengths at the same time as at optical wavelengths, there was no significant change in the X-ray brightness over the outburst cycle. By comparing the outburst properties of UCBs and dwarf novae, we will obtain a greater understanding of the physics of outbursts in general.

Asteroseismology of Pulsating White Dwarf Simon Jeffery reports that, during May 2009, he observed the pulsating DB white dwarf WD 1654–160 with the 4 m William Herschel Telescope. Part of the ‘Whole Earth Telescope’ (WET) campaign, including 25 cooperating observatories between 15 May and 10 June 2009, the observations have been obtained to resolve the internal structure of this DB white dwarf using asteroseismic techniques. Jeffery’s high signal-to-noise high time-resolution photometry will help to resolve theoretical uncertainties in the physics of convection in the white-dwarf atmosphere by enabling the ratio of mixing length to pressure scale height to be directly measured.

Subsurface Convection Zones in Massive Stars Jorick Vink reports that he and collaborators have studied convection zones in the outer envelopes of massive stars that are caused by opacity peaks associated with iron and helium ionization. A stellar evolution code was employed to compute a grid of massive star models at different metallicities. It was found that the iron convection zone is more prominent for objects with lower surface gravity, higher luminosity and larger metallicity.

The resulting models were compared with the occurrence of four observable phenomena in O-type stars: microturbulence, non-radial pulsations, wind clumping, and line-profile variability. The confirmation of trends for the iron convection zone as a function of stellar parameters by empirical microturbulent velocities argues for a physical connection between sub-photospheric convective motions and small-scale stochastic velocities in the photosphere of OB stars. It was also suggested that clumping in the inner parts of the winds of OB stars could be caused by the same mechanism, and that magnetic fields produced in the convection zone could appear at the surface of OB stars.

Testing for Disks Around O-type Stars As the favoured progenitors of long-duration gamma-ray bursts (GRBs), massive stars may provide the best indicators of individual objects in the early Universe. However special conditions seem required to make these GRBs, for example they might originate as a result of the progenitor’s rapid rotation and associated asymmetry. In order to obtain empirical constraints on the interplay between stellar rotation and stellar-wind asymmetry, Jorick Vink and collaborators performed linear polarimetric measurements on a sample of spectroscopically peculiar massive O stars. Despite their rapid rotation, most O-type stars were found to be spherically symmetric, but with notable exceptions amongst specific object classes. Some groups of peculiar O stars, such as the Oe stars, lie in the high-end tail of the O-star rotational velocity distribution and have in the past been proposed as examples of stars embedded in disks. Jorick Vink and collaborators, however, have found that the overall incidence of linear polarization amongst Oe stars is significantly lower than that amongst Be stars. This implies that there is as yet no evidence for a disk hypothesis in Oe stars, and also provides important constraints on the physical mechanism responsible for the Be phenomenon, which represents a further long-standing problem in stellar astrophysics.

Probing the Interstellar Medium Near OB Associations Jorick Vink and collaborators have studied the evolution of massive stars in OB associations and their impact on the surrounding interstellar medium environment using a population synthesis code. A new population synthesis code was developed during the year to model the emission of different forms of energy and mass outflow from stars in OB associations. The code follows the ejection of radioactive isotopes such as ^{26}Al and ^{60}Fe , as well as the emission of hydrogen-ionizing photons and the kinetic energy of stellar winds and supernova explosions. It was found that the inclusion of rotation in the stellar models has a significant impact on the interactions between OB associations and the surrounding interstellar medium. The emission of ^{26}Al in the stellar winds from rotating stars is strongly enhanced compared to non-rotating models with the same mass-loss prescription. This works against the recent reductions in estimates of the mass-loss rates from massive stars due to the effects of wind clumping. Despite lower mass-loss rates, the power of the winds is found to be enhanced in rotating stellar models. The supernova power (i.e. the kinetic energy of their ejecta) is decreased due to longer lifetimes of rotating stars, and therefore the kinetic energy of wind power dominates over that of supernovae for the first ~10 Myr after a burst of star-formation.

Technical Equipment Martin Murphy reports that the Observatory’s Internet connection was upgraded from a bandwidth of 10 Mbps to 100 Mbps on 27 November 2009. The upgrade was successfully carried out under the auspices of the Northern Ireland Regional Area Network (NIRAN) with no noticeable disruption to the Observatory’s regular activities. This upgrade to the Observatory’s access to the Internet has provided a very cost-effective solution to the Observatory’s future Internet requirements.

Martin Murphy and Geoff Coxhead have maintained the Observatory’s computer systems and technical equipment to a high specification and with a very high level of operational ‘up-time’ throughout the year. The High-Performance Computer Cluster (the ‘Beehive’), originally installed in November 2004, is now in its fifth year of operation and will soon need to be replaced. Since it was first launched, the system has completed more than 42 processor-years of CPU activity, indicating how many research projects would have been impossible to complete within a reasonable time-scale without access to this important in-house facility.

Martin Murphy also reports that during 2009 he implemented a 'cleaner' and more modern layout for the Observatory's web-sites as well as changes to improve web-accessibility for all users. The Observatory's accounting system, shared with the Armagh Planetarium, was successfully upgraded from Sage Line 100 to Sage line 200 during 2009; the new system provides greater flexibility and additional features compared with the previous version.

Conferences, Workshops and Scientific Meetings

High-Performance Computing at Armagh Gerry Doyle reports that staff and students from institutions throughout the island of Ireland visited the Armagh Observatory to attend three advanced courses on High Performance Computing (HPC) over the 4-day period 16-19 February 2009. The courses were funded by the UK Science and Technology Facilities Council (STFC) and delivered by staff from the Irish Centre for High-End Computing (ICHEC) and the National University of Ireland, Galway. They were aimed at the Observatory's postgraduate and postdoctoral researchers, with participants including PhD students from Queen's University Belfast and Trinity College Dublin. The object of these courses was to ensure that the Observatory's PhD students and postdoctoral research assistants have the computing skills to make greater use of supercomputer facilities, including the Observatory's own HPC cluster. Such skills are in demand not just in astronomy but throughout the economy in a wide range of computational, engineering and applied science domains beyond pure research.

Second Cross-Border Schools Science Conference The second Cross-Border Schools Science Conference (SSC 2009) 'Discover the Stars at Armagh' took place over the two days 29 and 30 April 2009. This was one of the Observatory's major IYA 2009 activities, involving approximately 250 school children from thirteen schools in both jurisdictions. The conference was jointly organized by Mark Bailey and Miruna Popescu (Armagh Observatory) and Andy Pollak and Patricia McAllister (Centre for Cross Border Studies), together with Colin Johnston (Armagh Planetarium) and Warren Fowles and Robert Cardwell (Royal School Armagh). Funding to support the meeting came from the Republic of Ireland's 'Discover Science and Engineering' (DSE) programme and the DCAL through grant-in-aid to the Armagh Observatory.

The plenary lecture, 'The Science of Armageddon', was given by Jay Tate, director of the Spaceguard Centre, Knighton, Powys, who together with his wife Anne provided a series of four meteorite workshops each day as part of the cycle of four activities provided to each group of children (32 in each group) during each day of the conference. Leaflets, posters and other materials distributed to conference participants, teachers and schools were provided by the Armagh Observatory and Armagh Planetarium, and other bodies including the European Space Agency (ESA), the European Southern Observatory (ESO), the Faulkes Telescope project, NASA, the Royal Astronomical Society and the STFC.

Ninth European Symposium for the Protection of the Night Sky 'Light Pollution and its Impact' The DSE programme also awarded the Observatory funding to support the international conference 'Light Pollution and its Impact'. This was a further very generous contribution by DSE to the Observatory's programme of Science in the Community and to the Observatory's IYA 2009 activities. The meeting was a partnership between a number of bodies (principally the Irish Light Pollution Awareness Campaign, the Armagh Observatory, the Royal Irish Academy, the Irish Astronomical Association and other amateur astronomy groups, the Northern Ireland Space Office [NISO] at Armagh Planetarium, the International Dark-Sky Association and the Armagh City and District Council), and was launched with a public lecture by Leo Enright at the Royal Irish Academy, Dublin, on 16 September 2009. This public lecture was repeated in Armagh the following evening, after which the conference included two very intensive days of plenary and parallel sessions covering all aspects of light pollution as well as primary and secondary education sessions on 18 and 19 September 2009 organized by Robert Hill (NISO) and Miruna Popescu.

Science in the Community

The principal strands of the Observatory's programme of Science in the Community, which during 2009 was augmented by a very active contribution of the Observatory to the International Year of Astronomy, are identified below. Full details of all these activities are provided in the Annual Report for calendar year 2009 (see <http://star.ar.ac.uk/annrep/>). The principal activities are:

1. supervising typically 8–16 school students per year for programmes of school work experience or work shadowing for periods ranging from days up to a week or more at a time;
2. providing a programme of summer work experience to school work-experience students as part of the Nuffield Science, Technology, Engineering and Mathematics (STEM) Bursary Scheme, managed within Northern Ireland by the Sentinus programme and coordinated within the Observatory by Research Astronomer Simon Jeffery;
3. providing a summer programme to provide advanced research projects to undergraduate students;
4. collaborating with schools and other bodies to provide students with opportunities to obtain observations of astronomical objects 'live' over the Internet using the Faulkes Telescopes: two professional-class 2-metre telescopes located in Hawaii and Australia;
5. supervising an adult with special needs for four hours per week during 2009 as part of a therapeutic work-experience placement;
6. delivering a programme of public lectures and other special events open to the general public;
7. providing information on astronomy and related sciences, whether through press releases and the Observatory's web-sites, or by responding to direct questions from the media or general public;
8. providing guided visits to the Observatory and guided tours of the Observatory Grounds, Astropark and Human Orrery;
9. participating in European Heritage Open Days and related Northern Ireland events, for example the Department of the Environment's programme of Archaeology Days;

10. developing of the Observatory Grounds and Astropark as a unique visitor facility to develop Cultural Tourism, for example by promoting the Observatory's world-class research, collaborating with cognate bodies to develop 'signature' tourism projects, or working with others to bring inspirational public art with an astronomical theme to the City of Armagh; and
11. promoting wider understanding of science and of astronomy amongst young people by working with partner organizations in the international Universe Awareness ('UNAWA') programme (see <http://www.universeawareness.nl/>; http://star.arm.ac.uk/publicevents/UNAWA_Armagh_report.pdf), for example through the highly successful 'Astro-Art Fun' programme developed by the Observatory's Outreach PDRA Miruna Popescu and the new interdisciplinary programme 'Over us All is the SElf-same Sky' (OASES), a project that builds on this work and was started towards the end of 2009 in collaboration with the Armagh Rhymers.

Environmental Sciences and Meteorology

Grounds and Astropark The Observatory's Grounds and Astropark provide an inner-city haven for wildlife, and with appropriate conservation management are becoming an area of growing biodiversity including both flora and fauna. The Grounds and Meteorological Officer, Shane Kelly, reports that two new Lilac plants (*Syringa chinensis* "Red Rothomagensis") and three Hazels (*Corylus avellana*) were received during 2009 from the Department of Botany, Trinity College Dublin, to augment the phenology garden and that the 2009 phenology data have been forwarded to the International Phenology Network coordinating laboratory in the Institute of Plant Sciences, Humboldt-University, Berlin.

Shane Kelly also notes that improved conservation management is leading to a noticeable increase in raptor appearances, evidenced in a greater kill of wood pigeons by sparrow hawks. Increased kestrel activity has also been seen and reported by members of the public, showing that birds are hovering over the edge of the wild and naturalized areas. There have also been occasional sightings of buzzards, especially circling areas where rabbits are active, and evidence that larger animals beginning to traverse the grounds, probably also in response to the growing rabbit population.

The very cold spell that occurred during December 2009 and January 2010 led to a significant number of Redwings (migrating from Iceland, Russia and Scandinavia in October) appearing in the grounds. This is an indication of the intensity of the cold, as conditions must have become intolerable in the surrounding countryside where they would have been feeding before the onset of the extreme weather period. The Grounds and Meteorological Officer reports that he had not seen these birds in the grounds in such numbers before, and for the first time in ten years he began to discover dead birds: five in three days, and all Redwings. In response, feeding posts for the birds were established and maintained until the thaw. No further dead birds were found. The provision of food extended to the crow family, rabbits, squirrels and other species.

Conservation work to increase biodiversity continues. During the summer, grasshoppers appeared in a grass area that had been left uncut as part of habitat creation. Prior to this there is no record of this species anywhere in the grounds. At least one pair of Bullfinches (Red List) is in evidence around the Bungalow area. Rabbits continue to attract the attention of buzzards and other predators which add to the biodiversity of the grounds. Work to increase biodiversity will continue, and there are plans to install signage in the Grounds to raise public awareness.

Meteorological Readings at Armagh Daily meteorological readings are taken by the Grounds and Meteorological Officer, and by other staff. The data are of growing interest and importance for wider studies of climate change, and are increasingly the subject of close scrutiny owing to the information they contain on how Northern Ireland's weather patterns may be changing as we enter an era of rapid climate change. All data are publicly available at <http://climate.arm.ac.uk/>.

It is perhaps of interest to note that ten of the past fifteen years have registered mean annual temperatures at Armagh greater than 10°C, although both 2008 and 2009 were substantially less warm than these extremes. However, although 2009 was by no means a cold year, the annual average temperature measured at Armagh during the year, 9.87°C, like that in 2008 (mean temperature 9.77°C), was significantly cooler than the previous record years of 2006 and 2007 (10.46°C and 10.62°C respectively). Total precipitation at Armagh during 2009 (892.15 mm) was slightly higher than in recent years (cf. 831.15 mm, 825.53 mm and 859.25 mm for 2006, 2007 and 2008 respectively).

Nevertheless, it should be emphasized that the Northern Ireland weather is extremely variable, and scarcely a year goes by without one or another extreme or unusual weather event being noted. Thus, although 2009 was slightly wetter than recent years it was not a particularly wet year, and indeed six months were wetter than average and six months were drier. November 2009, however, was exceptionally wet; the total recorded precipitation of 171.8 mm made it the second wettest November on record at Armagh, i.e. since Armagh rainfall records began in 1838. The four wettest Novembers at Armagh are respectively 1852 (188.4 mm), 2009 (171.8 mm), 1890 (163.8 mm) and 1995 (151.2 mm).

April 2009 was also rather wet, being the wettest April since 2002 and the 13th wettest April at Armagh on record, with a total recorded precipitation of 91.2 mm. On the other hand, February 2009 was the 13th driest February on record (with a total precipitation of 19.55 mm), and September 2009 was similarly dry (the 12th driest on record), with a total precipitation of 23.85 mm of which more than half fell on one day (2 September 2009). September 2009 was the driest September for 20 years, i.e. since 1990.

The year will be remembered, however, mostly for the very cold December, with an average temperature of 3.0°C, more than a degree cooler than the long-term average December temperature at Armagh and substantially cooler than recent Decembers. December 2009 was the coldest December in Armagh since 1981, with snowfall recorded on seven days (18th to 23rd and 30th) and a lowest

minimum air temperature of -6.6°C on Christmas morning, 25th December, with lying snow. December 2009 was also the driest December for nearly ten years (i.e. since 2001), and this despite 15.5 mm of rainfall occurring on 4 December 2009.

Climate Signal in Tree-Ring Chronologies Emeritus Research Astronomer John Butler reports the publication during 2009 of a paper by his former PhD student Ana García-Suárez together with Professor Mike Baillie (QUB) and himself, namely “Climate signal in tree-ring chronologies in a temperate climate: a multi-species approach” (*Dendrochronologia*, 27, 183–198, 2009). For more details, see http://star.arm.ac.uk/press/2009/treerings_2009dec.html.

Collaboration with Queen’s University Belfast Dr Luc Rock, an RCUK Research Fellow in the Queen’s University Belfast School of Planning, Architecture and Civil Engineering (SPACE), has initiated a project to analyze the isotopic composition of oxygen and hydrogen in rainwater (principally $O^{18}O^{16}$ and D/H, compared to Standard Mean Ocean Water [SMOW]), with the objective to establish a meteorological water line for Northern Ireland, the aim being to understand better the hydrological cycle and the principal sources of precipitation in the country. Shane Kelly, the Grounds and Meteorological Officer, has collected daily rainfall amounts in test tubes provided by QUB, storing them in a refrigerator for later collection and analysis. During 2009, this work provided data for a final-year undergraduate research project and has since been continued as part of a PhD project by another QUB student.

Dr Rock has also arranged for the Observatory to be included in the international Global Network of Isotopes in Precipitation (GNIP) programme, a network of rainwater isotope-composition stations led by the Vienna-based International Atomic Energy Agency (IAEA). The assigned GNIP code for Armagh Observatory is 0391301. Currently, there is no other such station in Northern Ireland, and just one station in the Republic of Ireland, namely the observatory at Valencia, Co. Cork. This collaboration therefore helps to improve what is currently a very sparse data network on the island of Ireland.

In another environmental studies collaboration with QUB, the Observatory is providing one of the locations for a project ‘Biological Soiling of Stone in Northern Ireland’ aimed at better understanding the potential impact, owing to climate change, of predicted increased winter wetness on stone buildings. The project is managed by Catherine Adamson, a postgraduate student in the QUB School of Geography, Archaeology and Palaeoecology (GAP) under the supervision of Professor Bernard Smith and Dr Patricia Warke (both School of GAP, QUB).

Performance

Performance indicators (PIs) provide a means to assess the Observatory’s performance in different spheres of activity, encompassing front-line scientific research in astronomy and related sciences; preservation and restoration of Northern Ireland’s scientific, cultural and built heritage; maintenance and development of the unique climate archive; and the promotion of public understanding of science through a vibrant programme of Science in the Community including education, lifelong learning and public outreach.

In the past, four Key PIs were used to span all these objectives, namely (1) External Grant Income; (2) Refereed Scientific Journal Publications; (3) Distinct e-Visitors to the Observatory’s web-sites; and (4) Identified Media Citations in the press, digital media and on radio and television. Data referring to each of these measures have been collected systematically over several years and are presented in each year’s Annual Report, as too has the Observatory’s peer-reviewed assessment in the periodic Research Assessment Exercise (RAE). In addition, in recent years, the Observatory has been required to report its performance against a basket of new Government Key PIs, namely:

- A. **“Rate of Return”**. This is the ratio of total external income as a percentage of total income per financial year following resource accounting rules. In recent years, the result (which takes no account of the value of the Observatory’s significant use of external facilities) has averaged around 20 %. In general, a high value is better, though it must be remembered that the Observatory is not a commercial organization.
- B. **“Administrative Efficiency”**. This is the ratio of total governance and administration costs as a percentage of total expenditure per financial year. This provides a measure of the efficiency or ‘value for money’ of the Armagh Observatory in delivering a high-quality astronomical service at the lowest reasonable cost. A low percentage administrative cost is better.
- C. **“Staff Absence”**. This is the average number of days absence per person per calendar year (days per person per year). A low value is better.
- D. **“Refereed Publications”**: the number of scientific papers published per calendar year in refereed scientific journals. In general, a high value is better, though high-quality, influential work is more important and can also appear in other media such as books, conference publications and so on.

Results for these key PIs for 2006/2007 et seq. as well as for prior years for which we have data and targets for 2009/2010 and 2010/2011, are shown in Table 1. Results for these and other PIs that are routinely collected to assess the Observatory’s performance in different areas of activity are also shown in Table 2. In addition to these specific performance indicators, various other data are routinely recorded for statistical or internal management purposes, many of which are presented in tabular or narrative form in each year’s Annual Report. For past reports, see <http://star.arm.ac.uk/annrep/>.

Calendar or Financial Year	Rate of Return Key PI 'A'		Admin. Efficiency Key PI 'B'		Staff Absence Key PI 'C'		Refereed Publications Key PI 'D'	
	Actual (%)	Target (%)	Actual (%)	Target (%)	Actual (d/p/yr)	Target (d/p/yr)	Actual (per year)	Target (per year)
2004 or 2004/2005	19.9	–	6.5	–	0.4	–	41	32
2005 or 2005/2006	18.1	–	7.2	–	0.4	–	47	35
2006 or 2006/2007	19.0	20.0	9.8	10.0	0.2	12.0	47	40
2007 or 2007/2008	20.7	20.0	7.4	8.8	0.5	11.0	57	45
2008 or 2008/2009	20.2	21.5	8.2	8.2	1.7	10.0	53	50
2009 or 2009/2010	24.2	21.5	8.0	8.2	3.0	10.0	41	50
2010 or 2010/2011		21.5		8.2		9		50
2011 or 2011/2012		21.5		8.2		9		50

Table 1: The trend of annual results for key performance indicators agreed with the DCAL during 2006. The first column denotes the calendar or financial year. The percentage Rate of Return (Key PI 'A') corresponds to the ratio of total external income to total income per financial year; Admin. Efficiency (Key PI 'B') represents the ratio of the total expenditure of the Observatory on governance and administration to total expenditure, again per financial year; Staff Absence (Key PI 'C') denotes the average number of days absence per person per calendar year (d/p/yr); and Refereed Publications (Key PI 'D') denotes the number of refereed journal papers produced by Observatory staff in each calendar year.

Performance Indicator	Result for 2008 or 2008/2009	Result (2009 or 2009/2010)	Target (2010 or 2010/2011)
A: 'Rate of Return'	20.2%	24.2%	21.5%
B: 'Admin. Efficiency'	8.2%	8.0	8.2%
C: 'Staff Absence' (days/person/year)	1.7	3.0	9.0
D: 'Refereed Journal Publications'	53	41	50
External Grant Income Received In-Year (£000s)	242.8	346.7	300.0
Other External Income Received In-Year (£000s)	11.5	9.9	15.0
Distinct e-Visitors (millions)	1.00	0.91	0.90
Web-Site 'Hits' (millions)	13.6	15.5	15.0
Data Exported (TB)	7.01	7.82	8.00
Identified Media Citations	413	442	250
Astropark Visitors Numbers	45687	55299	45000

Table 2: End-year results for various Armagh Observatory Performance Indicators.

It should be noted that in this report all items with the exception of financial matters refer to calendar year. We also remark, in order to avoid any confusion, that total external grant income received in cash terms per financial year is not the same as the total external grant income per financial year shown in the accounts or total external income as defined implicitly in key PI 'A' Rate of Return (Table 1). The latter is calculated on an accruals basis following Resource Accounting rules.

Business Plan Outturn 2009/2010

The principal Business Plan objectives for 2009/2010 were to:

- obtain external grants and funding to support new research projects — **done**;
- strengthen the Observatory's research capacity and capability in Solar-System Science, Solar Physics, and Stellar and Galactic Astrophysics, by recruiting 3–5 PhD students and providing a high-quality research environment to facilitate the advanced training of students at the beginning of their astronomical careers, and by playing a full role together with other academic partners in plans to upgrade NIRAN and through this the Observatory's connection to the Internet (then 10 Mbps) — **done**; and
- advance plans for the design of a new Library, Archives and Historic Scientific Instruments building, partial funding for which had been provisionally identified within the DCAL indicative Capital budget from 2010/2011 — **done in part**.

The Observatory also planned to maintain its programmes of Science in the Community, and to play a leading role in public events associated with the United Nations International Year of Astronomy 2009 (IYA 2009), designated by the UN to mark the 400th anniversary of Galileo's first use of a telescope for astronomical observations. As part of IYA 2009 for example, the Observatory co-organized the Second Cross-Border Schools Science Conference in Armagh (29–30 April 2009) and

the Ninth European Symposium for the Protection of the Night Sky (held in Dublin and Armagh from 16–20 September 2009); and a member of staff, namely Dr Miruna Popescu, played a key role in the promotion and administration of IYA 2009 throughout the island of Ireland. **IYA 2009 activities were a highlight of 2009.**

The Observatory also has an important function to promote and preserve the historic library, archives and museum collection at Armagh, which together represent a very significant component of Northern Ireland's scientific heritage. At the beginning of the reporting period it was planned that work which began during 2008/2009 to conserve and restore some elements of this collection would be continued during 2009/2010, and efforts would be made to digitize the most important archives, making the material accessible via the Internet to researchers, scholars and the general public from anywhere in the world. **Some of this work completed during 2009.**

Finally, we note that the necessary upgrade to the Observatory's connection to the Internet, increasing the Observatory's bandwidth by a factor of ten from 10 Mbps to 100 Mbps, was implemented during 2009 under the auspices of NIRAN and with continued financial support from the DCAL.

The trends of the various key performance indicators which represent the sum of the Observatory's principal strategic objectives are summarized in Tables 1 and 2. Taken together, these Tables show that the Armagh Observatory has achieved considerable recent success and is well-placed to build on these activities and to make further very significant contributions to scientific research and education, and to Northern Ireland's Cultural Capital.

Objectives for 2010/2011

The Armagh Observatory is a vibrant international research institute that plays a full role in international astronomy whilst developing and promoting the rich heritage of Northern Ireland astronomy and presenting an attractive and positive image of Northern Ireland on the international stage. The principal Business Plan objectives for 2010/2011 are to:

- obtain external grants and funding to support new research projects;
- strengthen the Observatory's research capacity and capability in Solar-System Science, Solar Physics, and Stellar and Galactic Astrophysics, by recruiting 3–4 PhD students and providing a high-quality research environment to facilitate their advanced training as well as that of the postdoctoral staff at the Observatory at the beginning of their astronomical careers;
- progress plans for the design of a new Library, Archives and Historic Scientific Instruments building, a project that plays a central role in the Observatory's forward look; and
- build on the success of IYA 2009 by developing recent and past initiatives in education and public outreach that have grown from the Observatory's world-class programme of Science in the Community.

In addition to these programmes of frontline scientific research and public understanding of science, the Observatory has an important function to promote, preserve and widen access to the Observatory Grounds and the historic library, archives and museum collection at Armagh, which together represent a very significant component of Northern Ireland's scientific heritage. During 2010/2011 it is intended to continue, as resources allow, a programme to restore some elements of this collection, improve the conditions in which the collection is held, and digitize some of the most important archives in order to make them accessible via the Internet to researchers, scholars and the general public from anywhere in the world.

Targeting Social Need (TSN)

The Observatory's New TSN Action Plan (see <http://star.arm.ac.uk/TSN.html>) was last reviewed in January 2010. Although TSN is no longer a major overarching theme of Northern Ireland government policy, the principles underlying TSN and the Observatory's New TSN Action Plan remain relevant to the Observatory's wider programme of Science in the Community and its responsibilities as a recognized charity.

The Armagh Planetarium — Operating Review 2009/2010

Armagh Planetarium's mission is to advance and promote the knowledge and understanding of astronomy and related sciences to all members of the community.

Armagh Planetarium – DCAL strategic focus

This is in accord with the strategic focus of the Department of Culture, Arts and Leisure that has as its overall aim the creation and maintenance of “a confident, creative, informed and vibrant community.” The key objective of the Department (and of Armagh Planetarium) is: “to protect, nurture and grow our cultural capital for today and tomorrow.”

This strategic focus has led to our deliberate positioning of Armagh Planetarium as a place where impressionable young minds can be encouraged to make career choices in the sciences.

Coincidence of the Planetarium's aims and objectives and the DCAL's Public Service Agreements

The Planetarium's work promotes Public Service Agreements 2, 5, 9, 10, 19, & 20.

PSA 2 promotes the achievement of skills for prosperity and the Planetarium is an active supporter and promoter of the STEM agenda that will allow more children to choose careers in scientific subjects.

PSA 5 promotes tourism: the Planetarium is a unique venue in Ireland and an important part of the cultural infrastructure of Museums and Galleries. It is a well-known tourist attraction around the world, and attracts local and overseas visitors to experience the Planetarium, especially during the summer season. Our advertising is designed to promote the Planetarium as widely as possible to these potential visitors.

PSA 6 relates to children and the family. The Planetarium is a place where families can come with their children to experience the amazing depth of the cosmic story. We promote curiosity, an essential childhood skill.

PSA 9 is about contributing to Northern Ireland's economic, health and educational goals by increasing participation and access to Culture, Arts and Leisure activities. The Planetarium runs events for all members of the community and actively supports ethnic minority communities, eg. the Chinese community through the annual Chinese New Year event. It provides easy access to the space sciences for all of Northern Ireland's population as well as visitors from the Republic of Ireland and further afield. The Planetarium buildings are a significant cultural asset. As many of our visitors are young people we also provide an environment promoting future career paths in science, and we provide a safe place for children to visit as part of their school community or as part of their family.

Our Outreach programme achieves the same outcome, and our adult classes provide for the enhancement of the population's understanding of science and helps promote the establishment of a scientifically literate and well informed community.

PSA 10 is about helping children and young people achieve their full potential through education. The Planetarium's work is primarily educational and our activities support the needs of children of all age groups. In addition, people of all ages are able to learn about science and astronomy in an easy accessible way. We welcome people of all ages and make a special effort to ensure that we are inclusive for those with special needs, learning difficulties or any form of disability. Our policy is very clear, that we will make the effort to provide a stimulating and informative visit to everyone.

We also do this through our recruitment policy which does not seek to exclude people but rather to nurture and encourage staff to achieve their full potential by stretching themselves and discovering talents that they may not have fully appreciated or used.

PSA 19 is about raising standards in our schools and the Planetarium works to achieve this by supporting the new Northern Ireland curriculum and providing curriculum broadening experiences for school visitors. Our Outreach work also promotes this objective in the same way. We also service schools from all parts of the educational spectrum, including special needs, nursery, and all of the key stages.

Armagh Planetarium – DCAL strategic focus

This mission also supports the strategic focus of the Department of Culture, Arts and Leisure which seeks to create and maintain “a confident, creative, informed and vibrant community.” The key objective of the Department (and of Armagh Planetarium) is: “to protect, nurture and grow our cultural capital for today and tomorrow.”

This strategic focus has led to the deliberate positioning of Armagh Planetarium as a place where impressionable young minds can be encouraged to make career choices in the sciences.

Thus, the prime function of Armagh Planetarium is education: *everything* that we do at the Planetarium is related to education in the broadest sense. The synopsis below categorizes our work into a number of subsets to better understand the breadth and reach of the educational activities offered by the Planetarium.

On-site educational activities at the Planetarium comprise:

- Direct interaction with visitors to explain astronomy and associated sciences. This is related to the community support, public understanding of science and lifelong learning objectives of government.
- Working with visiting school children to support their learning, and this is designed to enhance the new Northern Ireland curriculum and promote the STEM agenda.
- Preparing and presenting regular adult education lifelong learning programmes for Queen's University.
- Working with special interest groups, including PROBUS groups, senior citizens, community organizations, minority groups, new Targeting Social Need groups, special needs schools and amateur astronomy societies.
- Answering astronomical queries from the general public by email, letter and telephone. We receive several such requests for help every day. Our staff provide expert assessment and explanations of possible meteorite finds.
- Producing Astronotes, a monthly newsletter which is written and edited by Planetarium staff. This is an important flagship for what we do, and we receive requests to reprint our articles.
- Presenting weekend, school holiday and summer activities for families and tourists on site.
- Interacting with Planetarium visitors who are given the opportunity to deal directly with our dedicated education staff.
- Collaborating with other bodies including Tourism Ireland, Heritage Island, the Northern Ireland Tourist Board and Armagh City and District Council to promote Armagh as a destination for visitors.
- Developing a new training initiative for student teachers in collaboration with Stranmillis College.

Outreach activities

- Performing outreach work with schools, community groups, and special events across Ireland.
- Taking the StarDome mobile planetarium to schools and other venues.
- Presenting talks, guest lectures, demonstrations etc. on request.

Internet activities

- Keeping the Planetarium's website current and developing new material. This fulfills our educational support role and provides an information service for students.
- Creating and producing instructional internet products for all age groups, Demonstration video clips are posted on the web at <http://www.youtube.com/user/ArmaghPlanetarium> & on Teacher Tube http://www.teachertube.com/viewVideo.php?video_id=162877&title=How_Do_Rockets_Work___Armagh_Planetarium).
- Maintaining and creating content for our social networking, blog and video sharing resources for users on the web. (<http://twitter.com/#search?q=armaghplanet>), <http://armaghplanetarium.blogspot.com/>) These are recent developments and are prompting an encouraging response.

It was an important audit recommendation to produce a written marketing plan and that the advertising money should be ring fenced. This has been done.

Review of Key Performance Indicators 2009/2010

Key Performance Indicators	Actual 2009/2010	Percentage of budgeted Target to date %	Budget Business Plan Figures
Visitor numbers	43,556	104	42,000
Outreach numbers	16,641	111	15,000
TSN numbers (included above)	1,427	148	1,000
Admissions income	£143,953	96	£150,000
Outreach income	£11,630	83	£14,000
Shop and Mail order income	£77,661	119	£65,000
External income as % of total income	33.9%	107	31.7%
Total cost per visitor/outreach	£12.60	97	£13.0
Administration costs as % of total costs	14.8%	109	13.6%
Google site ranking (max 10)* <i>Google site ranking comparison: See Table 1</i>	7	-	To be monitored
Webtrends §; Internet hits & Google Analytics*: Website stats		121,724 page views §	To be monitored
		35,5103 site hits §	
		2,000 video hits *	
Absence – percentage	1.8		1.0

	Show	Overall	Staff	Displays	Booking
<i>Visitor % satisfaction ratings to be monitored</i>	88	85	81	84	80

Google Page Ranking Information

We need to standardize how we assess our electronic presence, and are planning to work with DCAL's statistics unit to improve and refine these data. Google Analytics and Google page rankings are the best available, and we have extracted information and present it in this new table 1. It helps to explain how the Google page rankings work and provides some rating comparisons with other organizations. Google rate the sites on the quality of the links that other sites make to ours, thus it is a rank which is unaffected by what we can manipulate to increase our traffic, but which reflects what other external organizations think of the value of our site and their willingness to link to it. We also think that Google Analytics statistics provide a clearer and more accurate figure about how our site is used.

Colleagues at the Smithsonian National Air and Space Museum, Washington, DC, USA, one of the premier museums in the world also consider their electronic visitor numbers to represent part of their outreach programme. We have made significant improvements to our site since the middle of last year and continue to add to it and expand how we can contact and be contacted by e-visitors by setting up Facebook, Twitter and blog elements to the site. The Planetarium's video clips have been uploaded to YouTube and Teacher Tube and are recording a steady hit rate.

Site name	Google Rating (out of 10)
Space Connections UK	4
Giant's Causeway	4
UTV internet	5
Newcastle Planetarium	5
Techniquet Cardiff	5
Greenwich Planetarium	6
W5 Belfast	6
Dynamic Earth Edinburgh	6
Madame Tussauds London	6
Ulster Museum	6
Ulster Folk & Transport Museum	6
Blackrock Castle Observatory	6
Armagh Observatory	6
Vancouver Planetarium	6
Beijing Planetarium	6
Melbourne Planetarium	6
Cite de L'Espace Toulouse	6
Smithsonian Air & Space Museum	7
Royal Observatory Edinburgh	7
Science Museum London	7
Armagh Planetarium	7
European Space Agency	8
Google search engine site	8
Microsoft.com	9
BBC	9
NASA	9
	Feb 1 st 2010

Table 1 Google Page Ranking site ratings

Economic Appraisal Targets

The targets listed below are the aspirational targets which were used to provide a basis for the decision to proceed with the refurbishment of the Planetarium. The process and decisions taken were influenced by three reports. The first was dated October 2001 and this reported on the Research and Evaluation Services work, along with a technical assessment by Envision and Barnett and Associates. This report looked at options for the Planetarium's future. An addendum, carried by DCAL's Economic Services Unit in November 2002 included an economic appraisal to judge the viability of the options considered in the primary report. This report did not consider a refurbishment option to modernize and upgrade the Planetarium building: this was considered in a second addendum in July 2004. The targets listed below are drawn from this report.

ASPIRATIONAL TARGETS

1. Be, and to be regarded as being, the leading centre for space, astronomy and related science education and advice throughout the island of Ireland;
2. Provide a unique visitor experience that is balanced in terms of formal education and fun based learning by 2008;
3. Make a significant contribution to the implementation of the Northern Ireland Curriculum through the medium of space and astronomy education by the expansion of the outreach service to schools to a maximum level of 200 visits per annum;
4. Create, promote and attract cultural tourism by increasing visitor numbers to at least 60,000 per annum by 2009;
5. Be, by 2008 (and remaining), at the leading edge of centre-based and outreach learning through the use of quality, state-of-the-art resources;
6. Provide equal opportunity for all to access the wonders of space and astronomy, irrespective of social, economic, mental or physical well being by 2008
7. Beyond year 2, to recover annually at least 50% of all recurrent costs.

We consider these to be aspirational targets, the one which is most obviously lagging behind the target is the visitor numbers. To provide a comparison the National Space Centre in Leicester and its planetarium attracts 250,000 visitors per annum. The estimated hinterland of large cities in the UK midlands contains a population of approximately 6 million. Thus the NSC attracts 4.16% of this population. The population of Northern Ireland is 1.75 million and the Planetarium currently services 2.4 % of the local population.

We consider that we largely have achieved bullets 1, 2, 5, 6, and 7: we are working toward significant change relating to bullet 3 and we currently earn 55% of the grant awarded by DCAL (bullet 7 recurrent costs.)

HIGHLIGHTS OF THE YEAR 2009/2010

The following list provides some of the highlights of the past year.

INTERNATIONAL YEAR OF ASTRONOMY

The Planetarium took part in a number of International Year of Astronomy events and they are tabulated below. The total number of participants was 25,000.

Month	Date	Event
January	19-26	Indian Planetarium Society Goa
February	11 19 21	Victoria College Belfast Parents evening event King's Hall Prof Carl Murray Tara Centre Omagh
Mar	2 17	100 hours Astronomy webcast St Patrick's Day astronomy themed parade (750000 spectators)
Apr May	29 – 3	Bibliotheca Alexandrina Egypt
May	8 12 13 14 – 16 14 16 19 26 27 28 21 – 26	Omagh Library Larne Library Whiterock Library Royal Observatory Greenwich BAP meeting Balmoral Show Belfast Ballyclare Town Hall Public Outreach Enniskillen Library Holywood Library Downpatrick library Cookstown Library Paris & Toulouse APLF meeting
July	8	Carolyn Porco She is an Astronomer
Aug 14 – 15	14 – 15 16	Tall Ships Event Belfast Mount Stewart Weekend
JULY AUGUST	Both months	Star Wars Special Summer Exhibit
September	19 24 – 25 30	Extra Solar planets Don Pollaco Letterkenny Public Events STEM bus launch Stormont
October	17 22 – 25	IAA Stardome event Bradford College and Space Connections Teacher Training and Yorkshire Sculpture Park events
November	5 12 20 24 – 25	BT Harper She is an Astronomer Boys Brigade at Mullaghbrack pm event Video Conference Teacher Training session Sentinus Event at King's Hall
December	4 11	Kilkeel BB evening event Irish language launch

NEW SHOWS & WORKSHOPS

Following the submission of a report from the Education and Training Inspectorate (ETI), the Planetarium noted that there was a need to radically overhaul the way in which we worked with school children. This has been accomplished and we now have a completely new programme for all age groups. These new shows have been made in house and are tied to relevant quizzes in the theatre and

interactive workshops outside. We installed a new touchscreen computer which allows a single staff member to run the interactive shows and the quiz from the front of the theatre. We are still working on new workshops and shows and innovative ways of cementing the educational outcomes of visits.

SUMMER DISPLAYS: STAR WARS

Last summer we had a special summer exhibit based on an exhibit of Star Wars artefacts and helped out by the Emerald Garrison, the local Star Wars reenactment group. This formed an interesting and very authentic display with various mannekins, weapons and dioramas relating to the popular Star Wars franchise.

APOLLO DISPLAY

As 2009 was the 40th anniversary of the Apollo 11 Moon landing we set up a special display in the Kepler Room which ran for most of the year. It comprised a number of illustrations, information panels and a constant loop video of the Apollo 11 mission. We also were loaned a number of models and lunar meteorite samples which were on display. We borrowed the display cabinets from the Armagh Museum and are most grateful for their help.

NEW METEORITE DISPLAY

As the Ulster Museum was due to re-open in autumn 2009 after its major refit, they wanted to reclaim the meteorites which we had on loan. As we wanted to continue to display meteorites, we replaced the Museum meteorite samples in our display as they are an important element of the story of the Solar System and offer an opportunity to tell spectacular stories. We purchased two new specimens, a 140 kg nickel iron sample from Argentina and a polished pallasite from Magadan in Russia. These specimens provide us with the biggest and heaviest metallic meteorite on display in Ireland, plus a sample with large interlocking metal crystals and large olivine (peridot) crystals. We also relocated the Sprucefield fragment of the Bovedy-Sprucefield meteorite, which also fell 40 years ago in 1969.

OTHER MATTERS

During the year we:

- updated the Planetarium website with a revised Freedom of Information section which provides users with categories of information available and the means of accessing the information;
- reviewed and updated our policy on safeguarding children and vulnerable adults and provided staff with extensive training on these matters;
- recruited three new Education Support Officers to fill vacant posts;
- implemented new back-up systems for the hard disk drives of the Digistar projection equipment;
- set up new social networking sites to increase our on-line profile.

Armagh Planetarium: Objectives for 2010 - 2011

Key Performance Indicators	Target
Aspirational Visitor numbers (Economic Appraisal target)	60,000
Predicted Visitor numbers	43,000
Outreach numbers	10,000
Virtual Planetarium visitors	To be monitored
TSN numbers reached included above	1,000
Income from admissions	£143.3K
Income from Outreach Services	£10K
Income from shop and mail order sales	£75K
External income as a % of total income	31.9%
Total cost per visitor /outreach	£14.1

Actions required in 2010/2011 to achieve KPIs/targets

The past year of recession has been a difficult environment in which to sell a service. We adjusted our prices and discounted admission prices to increase numbers and while the public figures are reasonable, the schools obviously were being more careful to preserve their budget and their attendance figures are low. This must be our primary target this year, while seeking to maintain the family visitors.

1. We are seeking to broaden our message by getting involved in teacher training partnership with St Mary's and Stranmillis teacher training colleges. We have been working with former Education and Training Inspectorate (ETI) inspector Irvine Richardson to organize placements of Stranmillis third year trainee teachers in the Planetarium as well as running special induction sessions for the first year trainee teachers at the Planetarium to demonstrate what we can offer teachers to support their classroom activities. We will show them the full spectrum of our shows, workshops and demonstrations and use their skills to develop new material for the workshops that will be suited to the different age ranges. St Mary's will be brought into this as well.
2. We are offering a new element to our business via new video conference linkages. This is being installed as part of the C2K network that is installed in all Northern Ireland schools. The Hew Packard staff running the system see the Planetarium as an important element of the video conferencing network, and that our presence and activities will support the Science, Technology, Engineering and Mathematics (STEM) agenda. We hope that we can evolve this into a revenue-earning activity, but in the short term seek to make sure that all of the local schools know about our ability to interact with classes in real time. We have a provisional model which will involve: (a) speaking to the class teacher before we have a link set up; (b) have a video link session with the class and the teacher; (c) include a trip to the Planetarium to cover a supporting topic which cannot be done outside the theatre. The visit will also include one of our newly designed workshops, and there will be a follow up video link session. All of this is being prepared and validated in consultation with former ETI inspector Irvine Richardson.
3. We now have a written marketing plan.
4. We have applied for Regional Training unit Funding as part of our plan to run a new 4 day teacher training session in the summer for teachers of the classes which are underrepresented in our school visitor profile, Key Stages 2 and 3 and have new shows and workshops fully completed and nearing readiness. We are planning other monthly events throughout the year. We will continue to support science festivals and special events locally and in the Republic of Ireland, and following the recognition by the Education and Library Boards of the importance of the new STEM programme we are actively promoting our ability to help teachers deliver the STEM objectives. We anticipate that this will lead to a greater participation with Key Stage 3 school parties. We also are part of a large multinational consortium applying for European Union Framework 7 funding for a project titled Galileo Teacher Training Project (GTTP).
5. We will have our educational offerings quality assured by the ETI. This is in accord with our intention to continue providing curriculum support for schools. It is not our business to do the teachers' job, but rather to show how we can show the school visitors curriculum broadening activities. This process has started.

Armagh Observatory and Planetarium — Financial Review for the Year Ended 31 March 2010

Pension Scheme Disclosures

The Armagh Observatory and Planetarium provide pension benefits to staff through the Northern Ireland Local Government Officers' Superannuation Committee (NILGOSC) pension scheme, which is a statutory defined benefit scheme where employees are promised a specific benefit in the future regardless of the current or future investment performance of the scheme. Under the accounting rules relating to defined benefit pension schemes, Financial Reporting Standard (FRS) 17, the Armagh Observatory and Planetarium are required to disclose in their accounts their respective share of the overall scheme surplus/(deficit) and the estimated costs of providing retirement benefits to employees in the accounting periods in which the benefits are earned by the employees, and the related finance costs and any other changes in value of pension assets and liabilities. Details of the disclosures for the Observatory are shown in pages 44 to 46, note 20 and for the Planetarium in pages 59 to 61, note 19.

The FRS17 deficit in the balance sheet increased significantly in the year: at the 31 March 2010 the Observatory deficit was £1,444,000 (2008/2009: £649,000), and the Planetarium deficit was £1,136,000 (2008/2009: £454,000). This is principally due to the fact that the financial assumptions for scheme liabilities at 31 March 2010 were less favourable than they were at 31 March 2009, and mortality assumptions were increased to reflect improvements in life expectancy. The rate used to discount future liabilities decreased significantly due to a fall in corporate bond yields over the year and an increase in inflation expectations; a decrease in the discount rate will increase the liabilities. The investment returns were higher than expected but this positive impact has been significantly outweighed by the negative impact of the increase in scheme liabilities.

Included in the Statement of Financial Activities for the Observatory and the Planetarium are the pension service cost, which is the actuarial present value of pension benefits earned by staff during the year and the financing costs of the scheme for the year. The pension service cost includes past service costs because some additional benefits under the new scheme introduced on 1 April 2009 have been applied retrospectively, including the introduction of an extended death grant and extensions to the eligibility criteria for a dependant's pension.

The overall result on the Statement of Financial Activities for 2009/2010 after pension adjustments for the Observatory is a deficit of £794,331 (page 32) and for the Planetarium is a deficit of £671,889 (page 49). The operating result for the year can be computed as follows:

Reconciliation of net movement of funds after pension adjustment with the operating surplus for 2009/2010

	Armagh Observatory 2009/2010 £	Armagh Planetarium 2009/2010 £
Net movement in funds for the year after pension adjustments	(794,331)	(671,889)
Reversal of pension scheme adjustments:		
Pension service cost	106,000	32,000
Employer's pension contributions	(91,455)	(43,112)
Pension scheme finance costs	53,000	35,000
Actuarial gain/(loss) on pension scheme	727,000	655,000
Operating surplus before pension scheme adjustments	214	6,999

Armagh Observatory

Operating result

The overall result for the year was a surplus of £214 (2008/2009: £474), which was transferred to unrestricted funds leaving a balance of £82,237 (2008/2009: £82,023) in unrestricted funds before pension adjustments (page 41, note 13 in the accounts). Restricted funds of £7,293 remain unchanged from the previous year.

Income

Details of income received are on page 36, note 2.

The baseline recurrent funding from the DCAL remained unchanged at £817,000 for the year. The DCAL provided additional in-year funding of £105,000 for general operating costs and £15,000 for grounds survey fees for the Library, Archives and Historic Scientific Instruments building project and the purchase of archive materials.

The DCAL provided capital grant of £28,312 (2008/2009: £25,000) for computer and other equipment and further in-year capital grants of £50,000 for the construction of a base and the purchase of a dome for the Variable Star Telescope and £10,000 for additional air-conditioning in the Bungalow computer room.

Income from research and other grants increased significantly during the year: £346,733 (2008/2009: £242,772). The STFC Post-Doctoral Research grants awarded in 2008/2009 continued for a full year as opposed to a part-year in 2008/2009 and the Observatory was successful in obtaining additional grant funding from a number of other grant awarding bodies; the Leverhulme Trust, the Discover Science and Engineering Programme and the European Commission FP7 EuroPlaNet project. The total contribution from research and other grants towards research supervisory salary costs and estate and indirect costs was £109,205 in the year (2008/2009: £84,852).

Expenditure

Details of expenditure are on pages 36 to 38, notes 3 to 7. The main variances in expenditure were as follows:

- (i) salary costs of £804,717 (2008/2009: £718,892) increased by £85,825 due to salary inflation of 2.8% from 1 August 2009 for staff paid in accordance with NICS salary scales (based on the current pay offer from NICS Management), the inclusion of accrued costs for changes in the pay scales of Administrative Officer and analogous grades staff back-dated to 1 February 2009 in accordance with the NICS agreement on Equal Pay (December 2009), the appointment during the year of an additional PDRA staff member funded by a Leverhulme Trust research grant, and the introduction of pension service costs of £106,000 (as computed by the actuary) in salary costs instead of the cost of employer's pension contributions of £91,455;
- (ii) student maintenance grants of £110,397 (2008/2009: £98,735) increased because of higher average numbers of students during the year including the appointment of the new Lindsay Scholar and an inflationary increase by the STFC in the student maintenance grant;
- (iii) Observatory staff and students travelled extensively throughout the year to undertake collaborative research projects, attend scientific meetings and conferences and to deliver talks and papers. Of the total cost of £73,667 (2008/2009: £67,372), £42,623 is funded by research grants;
- (iv) scholarship and training costs of £16,015 (2008/2009: £8,715) increased because of additional corporate governance training costs shared with the Planetarium for members of the Board of Governors, Management Committee and the Directors and additional student tuition fees;
- (v) library and publications costs of £36,396 (2008/2009: £29,899) increased due to increased costs of journal and periodicals;
- (vi) archive materials and services of £19,975 (2008/2009: £5,579) included additional costs of £10,443 for archiving services provided by the Armagh Public Library and costs of £6,003 for archiving materials. The Observatory and the Armagh Public Library jointly obtained funding of £22,465 from the Pilgrim's Trust and the Northern Ireland Museums Council to assist with this work in the year commencing 1 January 2010;
- (vii) the costs of the Northern Ireland Regional Network (NIRAN) Internet provision of £22,665 (2008/2009: £25,621) reduced following the tendering exercise conducted by the NIRAN. The reduction in cost was accompanied by an increase in the bandwidth from 10 Mbps to 100 Mbps;
- (viii) the Light Pollution Conference costs of £6,928 (2008/2009: £nil) were fully funded by a grant from the Discover Science and Engineering Programme;
- (ix) insurance costs of £12,567 (2008/2009: £9,132) increased due to higher premiums;
- (x) heat, light and power costs of £35,592 (2008/2009: £31,413) increased due to an increase of 21,989 in units used attributable to increased usage of the computer cluster in the Bungalow and increased usage of electricity in the main Observatory building;
- (xi) property professional fees amounting to £11,630 (2008/2009: £1,382) included grounds survey fees of £7,957 for the Library, Archives and Historic Scientific Instruments building project which was funded by DCAL in-year recurrent grant;

Debtors

Grant debtors (page 40, note 10) amounting to £20,316 (2008/2009: £44,191) decreased with the payment in-year of the funds due from the National University Galway for IYA 2009 in debtors at 31 March 2009.

Accruals

Accruals (page 40, note 11) of £93,963 (2008/2009 £21,702) include accruals of £44,063 for the buildings works and the dome for the Variable Star Telescope, £6,003 for archive materials, £12,800 for the change in pay scales for staff in Administrative Officer and analogous grades due to the NICS Equal Pay agreement and £14,212 for salary inflation from 1 August 2009.

Deferred income

Deferred income (page 40, note 11) represents income from research and other grants which has been deferred to be matched against expenditure on the grants in future years. The main reason for the increase in the balance to £91,456 (2008/2009: £56,329) is the receipt in October 2009 of the first year of a three-year Leverhulme research grant. The balance of deferred income for the Leverhulme research grant at the year-end was £31,003.

Fixed Assets

Additions to fixed assets (page 39, note 9) comprise: (i) £22,750 for the Variable Star Telescope dome and £27,250 for the construction of the dome base; (ii) £14,958 for the upgrade of the Variable Star Telescope; (iii) £5,251 for air-conditioning in the Bungalow computer room; (iv) £5,750 for the NIRAN router; and (vi) £9,972 for computer equipment.

Factors which will Influence Future Financing Requirements

The DCAL have announced additional baseline recurrent funding of £210,000 for 2010/2011 which, together with contributions from research and other grants will be sufficient to fund budgeted unrestricted costs for the year.

If the contingent liability for the settlement sum arising from the Equal Pay agreement made between the NICS Management and the Trade Union Side (page 47, note 25) is realised additional recurrent funds of approximately £46,000 will be required. If the project for a new Library, Archives and Historic Scientific Instruments building proceeds additional recurrent funds of approximately £50,000 will be required for professional fees and other costs for the project Business Case.

Unrestricted operating costs are funded primarily by DCAL recurrent grant. The balance of the funding of approximately £119,000 is currently provided by contributions from STFC PDRA and other research grants and miscellaneous income. As the current STFC PDRA research grants will end during 2011 it will be necessary to obtain further STFC PDRA grants or other funding to maintain this important source of funds.

Armagh Planetarium

Operating result

The overall operating result was a surplus of £6,999 compared with a deficit of £564 in the previous year. The surplus was transferred to unrestricted funds leaving a balance of £12,780 (2008/2009: £5,781) in unrestricted funds before pension adjustments (page 57, note 13 to the accounts).

Income

The baseline recurrent funding from the DCAL remained unchanged at £483,000 for the year. The DCAL also provided capital grant of £21,604 for equipment.

Visitor numbers increased in the year leading to much higher levels of income from admissions and gross profit from shop and mail order sales; admissions income was £143,953 (2008/2009: £130,239), shop and mail order gross profit was £33,145 (2008/2009: £18,197).

The Planetarium received a total of £23,900 from restricted grants (2008/2009: £9,365) comprising £6,000 from the Ultach and £9,700 from Naiscoil Ard Mhacha to produce and promote Planetarium shows in the Irish language, £2,200 from the Discover Primary Science programme and £6,000 from the STFC Large Award Science in the Community scheme.

Details of income received are on page 53, note 2 to the accounts.

Expenditure

The main variances in expenditure were as follows:

- (i) staff salaries of £343,544 (2008/2009: £346,289) reduced by £2,745. Factors giving rise to cost increases were: salary inflation of 3.3% from 1 August 2009 for staff paid in accordance with NICS salary scales (based on the current pay offer from NICS Management); higher social security costs in the year because these costs were lower than normal in 2008/2009 because of the offset of statutory maternity pay; and the inclusion of accrued costs for changes in the pay scales of Administrative Officer and analogous grades staff back-dated to 1 February 2009 in accordance with the NICS agreement on Equal Pay (December 2009). These cost increases were offset by lower overall salary costs due to staff leaving in the year and the introduction of pension service costs (computed by the actuary) which were lower than the costs in the previous year;
- (ii) agency staff costs of £9,586 (2008/2009: £nil) were incurred to cover for periods between staff leaving and the appointment of replacements;
- (iii) travel and subsistence of £8,406 (2008/2009: £17,052) reduced due to a lower number of worldwide trips incurred by staff;
- (iv) equipment maintenance and computer consumables of £71,220 (2008/2009: £37,858) increased substantially due to higher toner costs arising from new printers purchased in 2008/2009, increased maintenance costs of the Digistar projection system, the purchase of new software and alterations to the Theatre lighting system;
- (v) production costs of £24,047 (2008/2009: £9,875) include costs of £11,436 to translate Planetarium shows into the Irish language which were fully funded by grants from the Ultach and the Naiscoil Ard Mhacha;
- (vi) training costs of £3,689 (2008/2009: £895) increased due to additional corporate governance training costs shared with the Observatory for members of the Board of Governors, Management Committee and the Directors;

- (vii) vehicle expenses of £7,723 (2008/2009: £3,585) include notional leasing costs of £3,480 for a vehicle provided free of charge for outreach and other educational services. The same amount is included as notional income in miscellaneous income;
- (viii) advertising costs of £22,286 (2008/2009: £44,304) decreased because the television advertising campaign costing £15,000 in 2008/2009 was not repeated in 2009/2010 and the level of other forms of advertising was reduced;
- (ix) insurance costs of £18,078 (2008/2009: £15,964) increased due to higher premiums ;
- (x) heat, light and power costs of £45,736 (2008/2009: £51,182) reduced in the year. Higher oil usage was offset by lower average prices per litre. Both electricity usage and the average price per unit were lower than the previous year;
- (xi) cleaning services and consumables of £20,339 (2008/2009: £15,949) increased because the cleaning services were extended to include the Administration building and because of inflationary increases in the rates charged;
- (xii) professional fees and licences of £8,883 (2008/2009: £12,481) reduced because 2008/2009 included non-recurrent costs for actuary's fees of £4,000, which were fully funded by additional DCAL recurrent grant;
- (xiii) recruitment costs of £1,915 (2008/2009: £nil) related to the recruitment costs of three Education Support Officer staff to replace staff who left during the year.

Details of expenditure are on pages 54 to 55, notes 3 to 6.

Debtors

Trade and grant debtors (page 56, note 10) of £1,982 (2008/2009: £14,706) were lower than the previous year because of the payment of debts due at 31 March 2009 for a planetarium project in the Yorkshire Museum and the payment of grant due from the Royal Society.

Creditors

Trade creditors (page 57, note 11) of £29,382 (2008/2009: £56,927) were lower than the previous year. The main reason for the decrease was that the previous year included a sum of £40,700 due to the supplier of the new Sage accounts system.

Accruals of £35,800 (2008/2009: £11,617) included accruals for salary inflation from 1 August 2009 of £7,300, back pay to 1 February 2009 for Administrative Officer grade arising from the NICS Equal Pay agreement of £6,200 and computer equipment received but not invoiced at the year-end.

Fixed Assets

Additions to fixed assets (page 56, note 8) of £21,604 comprised £8,616 for a video conferencing unit and £12,988 for computer equipment.

Factors which will Influence Future Financing Requirements

The Planetarium relies heavily on income from admissions, shop and mail order sales, outreach and other income to supplement the funding provided by the DCAL for unrestricted costs. In 2009/2010 income from these sources amounted to 33.9% of total income. The key task for the Planetarium in subsequent years is to build on visitor and outreach numbers and in so doing maximise the full potential of the Planetarium's science education services and provide additional sources of income for operational costs to supplement funding from the DCAL.

If the contingent liability for the settlement sum arising from the Equal Pay agreement made between the NICS Management and the Trade Union Side (page 62, note 24) is realised additional recurrent funds of approximately £25,000 will be required.

Remuneration Report — Armagh Observatory

The salary and pension entitlements of the Director of the Observatory were as follows:

Director	Salary 2008/2009	Salary 2009/2010	Accrued Pension at 31 March 2010	Real Increase in Accrued Pension	Accrued Lump Sum at 31 March 2010	Real Increase in Lump Sum	CETV at 31 March 2009	CETV at 31 March 2010	Real Increase in CETV
	£	£	£	£	£	£	£	£	£
M.E. Bailey	58,515	60,807	22,113	1,286	63,387	904	465,951	520,412	43,433

This section is subject to audit.

Signed:

Professor Mark Bailey MBE MRIA
Accounting Officer for the Armagh Observatory

Date: 9 July 2010

Remuneration Report — Armagh Planetarium

The salary and pension entitlements of the Director of the Planetarium were as follows:

Director	Salary 2008/2009	Salary 2009/2010	Accrued Pension at 31 March 2010	Real Increase in Accrued Pension	Accrued Lump Sum at 31 March 2010	Real Increase in Lump Sum	CETV at 31 March 2009	CETV at 31 March 2010	Real Increase in CETV
	£	£	£	£	£	£	£	£	£
T.R. Mason	58,515	60,757	10,334	1,118	28,050	400	180,981	209,929	25,148

This section is subject to audit.

Signed:

Dr Tom Mason MBE
Accounting Officer for the Armagh Planetarium

Date: 9 July 2010

The CETVs above have been calculated in accordance with guidance used by the Northern Ireland Civil Service in Employer Pension Notice EPN06/2010.

1. The Directors of the Observatory and Planetarium are the persons in senior positions having authority and responsibility for directing and controlling the activities of their respective organisations.
2. The salary of each Director shown above is based on the Northern Ireland Civil Service Grade 6 pay scale. No bonus was paid in the year and neither of the Directors receives any benefits in kind.
3. The service contracts of the Directors are open-ended until they reach the normal retirement age of 65.
4. Pension benefits are provided through the Northern Ireland Local Government Officers' Superannuation Committee Pension Scheme (NILGOSC). In the period up to 31 March 2009 members paid contributions of 6% of pensionable earnings to the scheme up until retirement. From 1 April 2009 banded contribution rates were introduced and for the year 2009/2010 the Directors paid contributions of 7.2% on pensionable pay.
5. The main benefits payable on retirement for service up to 31 March 2009 are: (i) a retirement pension at a rate of 1/80th of final pensionable pay for each year of membership of the scheme; and (ii) a lump sum retirement grant at a rate of 3/80ths of pensionable pay for each year of membership of the scheme. On death after retirement, the surviving spouse will receive a pension payable for 3 months (6 months if there are dependent children) paid at the same rate as the monthly retirement pension at the date of death and thereafter a spouse's pension of half of the retirement pension for life. On death in service, the scheme pays a lump sum death grant of twice pensionable pay, normally to the surviving spouse or, if the member was not married, to next of kin. For service from 1 April 2009 retirement pension will be at a rate of 1/60th of pensionable pay for membership built up after 31 March 2009 and further rights on pension augmentation, flexible retirement and family pension rights on death were introduced. Details of the changes can be obtained at <http://www.nilgosc.org.uk>.

6. The real increase in pension payable, lump sum and cash equivalent transfer value (CETV) shown above have been adjusted to take account of inflation and market investment factors. The CETV figures include the value of any pension benefit in another scheme which the individual has transferred to the NILGOSC.
7. A CETV is the actuarially assessed capitalised value of the pension scheme benefits accrued by a member at a particular point in time. The benefits valued are the member's accrued benefits and any contingent spouse's pension payable from the scheme. A CETV is a payment made by a pension scheme to secure pension benefits in another scheme when the member leaves a scheme and chooses to transfer the benefits accrued in their former scheme.

Statement of the Responsibilities of the Governors and Accounting Officers

Under the Audit and Accountability (Northern Ireland) Order 2003 the Governors are responsible for keeping proper accounts and proper records in relation to the accounts, and for preparing a statement of accounts in respect of each financial year in such form and containing such information as the DCAL, with the approval of the Department of Finance and Personnel, shall direct. The Accounting Officer of the DCAL has designated the respective Directors of the Armagh Observatory and Planetarium as the corporation's Accounting Officers. As Accounting Officers the Directors take personal responsibility for the propriety and regularity of the public finances for which they are answerable and for the keeping of proper accounts. They are required to sign the accounts thereby accepting personal responsibility for their proper presentation and to sign the Statement on Internal Control. Their relevant responsibilities as Accounting Officers, including their responsibilities for the propriety and regularity of the public finances and for the keeping of proper records, are set out in Managing Public Money Northern Ireland.

The accounts are prepared on an accruals basis and give a true and fair view of the corporation's state of affairs at the end of the financial year and of its income and expenditure, total recognised gains and losses and cash flows for the financial year. The accounts have been prepared in accordance with the Statement of Recommended Practice "Accounting and Reporting by Charities" (SORP 2005). The financial statements comply with the guidance issued by the Department of Finance and Personnel on the form and contents of the Annual Reports and Accounts of Executive Non-Departmental Public Bodies and in particular:

- suitable accounting policies have been selected and applied consistently (subject to changes arising on the adoption of new accounting standards);
- reasonable and prudent judgements and estimates have been made;
- applicable accounting standards have been followed, subject to any material departures disclosed and explained in the financial statements;
- the financial statements have been prepared on the going concern basis, unless it is inappropriate to presume that the corporation will continue in business.

The Accounting Officers are also responsible for safeguarding the assets of the corporation and hence for taking reasonable steps for the prevention and detection of fraud and other irregularities.

Statement of Disclosure of Information to the Auditors

So far as the Accounting Officers of the Armagh Observatory and the Armagh Planetarium in office at the date of the approval of these financial statements are aware:

- there is no relevant audit information relating to their respective organizations of which the auditors are unaware; and
- they have taken all the steps that they ought to have taken as Accounting Officers in order to make themselves aware of any relevant audit information relating to their respective organizations and to establish that the auditors are aware of that information.

Armagh Observatory — Statement on Internal Control

As Accounting Officer for the Armagh Observatory I have responsibility for maintaining a sound system of internal control that supports the achievement of the policies, aims and objectives of the Armagh Observatory, whilst safeguarding public funds and the assets of the Armagh Observatory for which I am personally responsible in accordance with the responsibilities assigned to me by the Governors of the Armagh Observatory and Planetarium and in Managing Public Money Northern Ireland.

The system of internal control is designed to manage risk to a reasonable level, rather than to eliminate all risk of failure to achieve policies, aims and objectives; it can therefore only provide reasonable and not absolute assurance of effectiveness. The system of internal control is based on an ongoing process designed to identify and prioritise the risks to the achievement of the Armagh Observatory's policies, aims and objectives, to assess the likelihood of the events occurring and the impact should they be realised, and to manage the risks effectively, efficiently and economically. The system of internal control has been in place in the Armagh Observatory for the year ended 31 March 2010 and up to the date of approval of the annual accounts, and accords with Department of Finance and Personnel guidance. The main procedures in place to monitor the effectiveness of the system of internal control are as follows:

- Regular meetings with officials from the DCAL to consider both operational and strategic issues and matters relating to the system of internal control.
- Continuous assessment of the quality of research through peer review of grant applications, applications for telescope time, and the submission of scientific papers to academic journals of national and international standing.
- Peer review of the research quality, capability and output of the Observatory through participation in the periodic Research Assessment Exercise.
- Regular reports by administrative staff on progress against principal financial targets and the projected financial outcome for the year and progress reports by staff responsible for major projects.
- Detailed progress reports to the Management Committee and Board of Governors at their regular meetings and inclusion of performance measures and results against targets in the annual operating plan.
- Annual reports from internal auditors to the Armagh Observatory and Planetarium Audit and Risk Management Committee on the system of internal control, which provide an opinion on the adequacy and effectiveness of the system and contain recommendations for improvement.
- Annual reports from external auditors to the Management Committee and the Board of Governors on the material issues relating to the annual accounts, which provide an opinion on whether the accounts give a true and fair view of the affairs of the organisation and of its incoming resources and application of resources.
- Periodic review of the Armagh Observatory Risk Register by the Director and the Administrator, and also by the Armagh Observatory and Planetarium Audit and Risk Management Committee. The principal risks to the achievement of the Armagh Observatory's policies, aims and objectives have been identified and recorded in the Armagh Observatory Risk Register together with the controls in place and any further controls required to manage the risk effectively, efficiently and economically. Reports on emerging issues and strategies to deal with any associated risks are made to the DCAL and to the Management Committee and Board of Governors of the Armagh Observatory and Planetarium at their regular meetings.

The risk associated with the use and processing of personal information is managed and controlled by: (i) the Corporation's Policy on Retention and Use of Personal Information which identifies the type of information held, the purposes for which it is held, the circumstances under which it is distributed to third parties and the officer responsible for ensuring that the Corporation complies with its obligations under the Data Protection Act; (ii) the restriction of access to such information to authorised personnel with user password protection; and (iii) the controlled and secure storage, distribution and disposal of this information.

There is an unresolved issue concerning whether the agreement on Equal Pay reached by the Northern Ireland Civil Service (NICS) Management and the Trade Union Side in December 2009 applies to Armagh Observatory staff on the same pay scales as those NICS staff covered by the agreement. The Armagh Observatory is bound to follow NICS pay scales and has taken legal advice on the issue; it is working with the DCAL to obtain a resolution of this exceptional situation.

As Accounting Officer, I have responsibility for reviewing the effectiveness of the system of internal control. My assessment is informed by the work of the internal auditors and the senior staff within the Armagh Observatory who have responsibility for the development and maintenance of the internal control framework, and by the comments made by the external auditors in their management letter and other reports. I have been advised on the effectiveness of the system of internal control and plan to address any weaknesses so as to ensure continuous improvement of the system.

A number of minor weaknesses were identified during the financial year 2009/2010 as part of the annual internal audit and appropriate action has been taken to resolve them.

Signed:

Professor Mark Bailey MBE MRIA
Director, Armagh Observatory

Date: 9 July 2010

Armagh Planetarium — Statement on Internal Control

As Accounting Officer for the Armagh Planetarium I have responsibility for maintaining a sound system of internal control that supports the achievement of the policies, aims and objectives of the Armagh Planetarium, whilst safeguarding public funds and the assets of the Armagh Planetarium for which I am personally responsible in accordance with the responsibilities assigned to me by the Governors of the Armagh Observatory and Planetarium and in Managing Public Money Northern Ireland.

The system of internal control is designed to manage risk to a reasonable level rather than to eliminate all risk of failure to achieve policies, aims and objectives; it can therefore only provide reasonable and not absolute assurance of effectiveness. The system of internal control is based on an ongoing process designed to identify and prioritise the risks to the achievement of the Armagh Planetarium's policies, aims and objectives, to assess the likelihood of the events occurring and the impact should they be realised, and to manage them effectively, efficiently and economically. The system of internal control has been in place in the Armagh Planetarium for the year ended 31 March 2010 and up to the date of approval of the annual accounts, and accords with Department of Finance and Personnel guidance. The main procedures in place to monitor the effectiveness of the system of internal control are as follows:

- Periodic review of the Armagh Planetarium Risk Register by the Director and the Administrator, and also by the Armagh Observatory and Planetarium Audit and Risk Management Committee. The principal risks to the achievement of the Armagh Planetarium's policies, aims and objective have been identified and recorded in the Armagh Planetarium Risk Register together with the controls in place and any further controls required to manage the risk effectively, efficiently and economically. Reports on emerging issues and strategies to deal with any associated risks are made to the DCAL and to the Management Committee and Board of Governors of the Armagh Observatory and Planetarium at their regular meetings.
- Detailed progress reports to the Management Committee and Board of Governors at their regular meetings, and inclusion of performance measures in the annual operating plan.
- Regular meetings with officials from the DCAL to consider both operational and strategic issues and matters relating to the system of internal control.
- Annual reports from the internal auditors to the Armagh Observatory and Planetarium Audit and Risk Management Committee on the system of internal control, which provide an opinion on the adequacy and effectiveness of the system and contain recommendations for improvement.
- Annual reports from external auditors to the Management Committee and the Board of Governors on the material issues relating to the annual accounts, which provide an opinion on whether the accounts give a true and fair view of the affairs of the organisation and of its incoming resources and application of resources.
- Regular reports by administrative staff on progress against principal financial targets and the projected financial outcome for the year and progress reports provided by staff responsible for major projects.

The risk associated with the use and processing of personal information is managed and controlled by: (i) the Corporation's Policy on Retention and Use of Personal Information which identifies the type of information held, the purposes for which it is held, the circumstances under which it is distributed to third parties and the officer responsible for ensuring that the Corporation complies with its obligations under the Data Protection Act; (ii) the restriction of access to such information to authorised personnel with user password protection; and (iii) the controlled and secure storage, distribution and disposal of this information.

There is an unresolved issue concerning whether the agreement on Equal Pay reached by the Northern Ireland Civil Service (NICS) Management and the Trade Union Side in December 2009 applies to Armagh Planetarium staff on the same pay scales as those NICS staff covered by the agreement. The Armagh Planetarium is bound to follow NICS pay scales and has taken legal advice on the issue; it is working with the DCAL to obtain a resolution of this exceptional situation.

There is also an unresolved issue concerning the payment by the Armagh Planetarium of an element of employee's superannuation contribution to the Northern Ireland Local Government Officers' Superannuation Committee. The Armagh Planetarium has submitted a proposal to DCAL to resolve the issue.

As Accounting Officer, I have responsibility for reviewing the effectiveness of the system of internal control. My assessment is informed by the work of the internal auditors and the senior staff within the Armagh Planetarium who have responsibility for the development and maintenance of the internal control framework, and by the comments made by external auditors in their management letter and other reports. I have been advised on the effectiveness of the system of internal control and plan to address any weaknesses so as to ensure continuous improvement of the system.

A number of minor weaknesses were identified as part of the annual audit for the 2009/2010 financial year and appropriate action has been taken to resolve them.

Signed:

Dr Tom Mason MBE
Director, Armagh Planetarium

Date: 9 July 2010

The Armagh Observatory and Planetarium

The Certificate and Report of the Comptroller and Auditor General to The Northern Ireland Assembly

I certify that I have audited the financial statements of the Armagh Observatory and Planetarium for the year ended 31 March 2010 under the Audit and Accountability (Northern Ireland) Order 2003. These comprise the Statements of Financial Activities, the Balance Sheets, the Cash Flow Statements, the Statements of Recognised Gains and Losses and the related notes. These financial statements have been prepared under the accounting policies set out within them. I have also audited the information in the Remuneration Reports that is described in those reports as having been audited.

Respective responsibilities of the Governors, Accounting Officers and auditor

The Governors and Accounting Officers are responsible for preparing the Annual Report, which includes the Remuneration Reports, and the financial statements in accordance with the Audit and Accountability (Northern Ireland) Order 2003 and Department of Culture, Arts and Leisure directions made thereunder and for ensuring the regularity of financial transactions. These responsibilities are set out in the Statement of the Responsibilities of Governors and Accounting Officers.

My responsibility is to audit the financial statements and the part of the Remuneration Reports to be audited in accordance with relevant legal and regulatory requirements, and with International Standards on Auditing (UK and Ireland).

I report to you my opinion as to whether the financial statements give a true and fair view and whether the financial statements and the part of the Remuneration Reports to be audited have been properly prepared in accordance with the Audit and Accountability (Northern Ireland) Order 2003 and Department of Culture, Arts and Leisure directions made thereunder. I report to you whether, in my opinion, the information, which comprises the Management Commentary and the Statement of Disclosure of Information to the Auditors included in the Annual Report is consistent with the financial statements. I also report whether in all material respects the incoming and outgoing resources have been applied to the purposes intended by the Assembly and the financial transactions conform to the authorities which govern them.

In addition, I report to you if the Armagh Observatory and Planetarium has not kept proper accounting records, if I have not received all the information and explanations I require for my audit, or if information specified by relevant authorities regarding remuneration and other transactions is not disclosed.

I review whether the Statements on Internal Control reflect the Armagh Observatory and Planetarium's compliance with the Department of Finance and Personnel's guidance and I report if they do not. I am not required to consider whether these statements cover all risks and controls, or to form an opinion on the effectiveness of the Armagh Observatory and Planetarium's corporate governance procedures or its risk and control procedures.

I read the other information contained in the Annual Report and consider whether it is consistent with the audited financial statements. This other information comprises the unaudited part of the Remuneration Reports. I consider the implications for my report if I become aware of any apparent misstatements or material inconsistencies with the financial statements. My responsibilities do not extend to any other information.

Basis of audit opinion

I conducted my audit in accordance with International Standards on Auditing (UK and Ireland) issued by the Auditing Practices Board. My audit includes examination, on a test basis, of evidence relevant to the amounts, disclosures and regularity of financial transactions included in the financial statements and the part of the Remuneration Reports to be audited. It also includes an assessment of the significant estimates and judgments made by the Governors and Accounting Officers in the preparation of the financial statements, and of whether the accounting policies are most appropriate to the Armagh Observatory and Planetarium's circumstances, consistently applied and adequately disclosed.

I planned and performed my audit so as to obtain all the information and explanations which I considered necessary in order to provide me with sufficient evidence to give reasonable assurance that the financial statements and the part of the Remuneration Reports to be audited are free from material misstatement, whether caused by fraud or error and that in all material respects the expenditure and income have been applied to the purposes intended by the Assembly and the financial transactions conform to the authorities which govern them. In forming my opinion I also evaluated the overall adequacy of the presentation of information in the financial statements and the part of the Remuneration Reports to be audited.

Opinions

In my opinion:

- the financial statements give a true and fair view, in accordance with the Audit and Accountability (Northern Ireland) Order 2003 and directions made thereunder by the Department of Culture, Arts and Leisure, of the state of the Armagh Observatory and

Planetarium's affairs as at 31 March 2010 and of its net movement in funds after cost of capital, cash flows and recognised gains and losses for the year then ended;

- the financial statements and the part of the Remuneration Report to be audited have been properly prepared in accordance with the Audit and Accountability (Northern Ireland) Order 2003 and Department of Culture, Arts and Leisure directions issued thereunder; and
- information, which comprises the Management Commentary and the Statement of Disclosure of Information to the Auditors included in the Annual Report, is consistent with the financial statements.

Opinion on Regularity

In my opinion, in all material respects the expenditure and income have been applied to the purposes intended by the Assembly and the financial transactions conform to the authorities which govern them.

Report

I have no observations to make on these financial statements.

KJ Donnelly
Comptroller and Auditor General
Date: 25 August 2010

Northern Ireland Audit Office
106 University Street, Belfast, BT7 1EU

Armagh Observatory

Statement of financial activities for the year ended 31 March 2010

	Notes	Unrestricted funds 2010 £	Restricted funds 2010 £	Total funds 2010 £	Total funds 2009 £
Incoming resources					
DCAL grants	2	937,000	88,312	1,025,312	954,000
Other grants and receipts	2	-	346,733	346,733	242,772
Interest receivable		380	-	380	2,446
Rents		6,097	-	6,097	5,469
Miscellaneous income		3,444	-	3,444	3,592
Transfer to deferred income	11	-	(59,850)	(59,850)	(39,575)
Transfer from deferred income	11	-	24,723	24,723	29,747
Transfer between funds		109,205	(109,205)	-	-
Total incoming resources		1,056,126	290,713	1,346,839	1,198,451
Resources expended					
Direct expenditure of the corporation	3	926,676	204,782	1,131,458	993,179
Fundraising and publicity	4	-	-	-	-
Management and administration of the corporation	6	143,781	-	143,781	125,848
Capital expenditure		-	85,931	85,931	76,950
Total resources expended		1,070,457	290,713	1,361,170	1,195,977
Net incoming/(outgoing) resources for the year before cost of capital					
		(14,331)	-	(14,331)	2,474
Cost of capital		-	(3,267)	(3,267)	(26,908)
Net movement in funds after cost of capital		(14,331)	(3,267)	(17,598)	(24,434)
Cost of capital reversed		-	3,267	3,267	26,908
Net movement in funds before finance income		(14,331)	-	(14,331)	2,474
Finance income/(costs) - pension scheme		(53,000)	-	(53,000)	4,000
Net movement in funds after finance income		(67,331)	-	(67,331)	6,474
Actuarial (loss)/gain on pension scheme		(727,000)	-	(727,000)	(556,000)
Net movement in funds after actuarial (loss)/gain		(794,331)	-	(794,331)	(549,526)
Balances brought forward at 1 April		(566,977)	7,293	(559,684)	(10,158)
Balances carried forward at 31 March	13, 14	(1,361,308)	7,293	(1,354,015)	(559,684)

All amounts above relate to continuing operations of the corporation.

The income and expenditure summary is included at Note 8.

Cost of capital at 3.5% has been charged on the average net assets of the corporation, excluding the net book value of donated assets. As this is a notional charge the cost of capital is reversed in the Statement of Financial Activities.

Statement of recognised gains and losses

	2010	2009
Net movement in funds for the year after other finance income	(67,331)	6,474
Net movement on government grant reserve	(1,448)	(5,695)
Net movement on donated assets reserve	(29,527)	(29,527)
Actuarial (loss)/gain on pension scheme	(727,000)	(556,000)
Recognised gains/((losses) for the year	(825,306)	(584,748)

Armagh Observatory

Balance sheet at 31 March 2010

	Notes	2010 £	2009 £
Tangible assets	9	3,589,003	3,619,978
Current assets			
Debtors	10	68,906	86,780
Cash at bank and in hand	18, 19	211,757	74,540
		280,663	161,320
Creditors: amounts falling due within one year	11	(206,398)	(87,724)
Net current assets		74,265	73,596
Net assets excluding pension liability		3,663,268	3,693,574
Long-term liabilities - pension scheme	20	(1,444,000)	(649,000)
		(1,444,000)	(649,000)
Net assets		2,219,268	3,044,574
Funds			
Unrestricted funds	13	(1,361,308)	(566,977)
Restricted funds	14	7,293	7,293
Government grant reserve	12	708,687	710,135
Designated funds	16	2,864,596	2,894,123
		2,219,268	3,044,574

The financial statements on pages 32 to 48 were approved on 9 July 2010 and were signed by:

Professor Mark Bailey MBE MRIA, Accounting Officer for the Armagh Observatory

Armagh Observatory

Cash flow statement for the year ended 31 March 2010

	Notes	2010 £	2009 £
Net cashflow from operating activities		136,857	(19,904)
Returns on investments and servicing of finance			
Interest received		380	2,446
Interest paid and similar charges		(20)	(37)
		360	2,409
Capital expenditure			
Purchase of tangible assets		(85,931)	(76,950)
Capital grants received		85,931	76,950
		-	-
Net cash inflow/(outflow) before financing and management of liquid resources		137,217	(17,495)
Management of liquid resources			
Movement in First Trust deposit account		(121,553)	46,263
Net cash (inflow)/outflow from management of liquid resources		(121,553)	46,263
Increase in cash in the year	18, 19	15,664	28,768

Reconciliation of operating result to net cash flow from operating activities

	2010 £	2009 £
Net incoming resources per statement of financial activities	(14,331)	2,474
Interest received	(380)	(2,446)
Interest paid and similar charges	20	37
Depreciation	116,906	112,171
Pension service costs	15,000	(2,000)
Release of deferred credit - Government grant reserve	(87,379)	(82,644)
Release of deferred credit - donated asset reserve	(29,527)	(29,527)
(Increase)/decrease in debtors	17,874	(34,315)
Increase/(decrease) in creditors	118,674	16,346
Net cash inflow/(outflow) from operating activities	136,857	(19,904)

Notes to the financial statements for the year ended 31 March 2010

1 Accounting policies

These financial statements are prepared on the going concern basis under the historical cost convention, as modified by the revaluation of certain tangible fixed assets, and in accordance with The Audit and Accountability (Northern Ireland) Order 2003, directions made thereunder by the Department of Culture, Arts and Leisure and applicable accounting standards. The principal accounting policies are set out below.

Tangible fixed assets

The cost of tangible fixed assets is their purchase cost or valuation together with any incidental costs of acquisition. Depreciation is calculated so as to write off the cost or valuation of tangible fixed assets, less their estimated residual values, on a straight-line basis over the expected useful economic lives of the assets concerned. Land is not depreciated.

The principal annual depreciation rates used are as follows:

	%
Furniture and fittings	10 - 15
Office equipment	10 - 25
Scientific equipment and other equipment	15 - 25
Buildings	1 - 3
Astropark	5
Exhibits and grounds	6 - 10

Land and buildings are included in the balance sheet at depreciated replacement cost, estimated value in use or market value.

Government grants

The Government Financial Reporting Manual requires that grants are to be shown as a movement in reserves rather than as income. However, as the corporation is required to prepare accounts in accordance with the SORP for charities, the DCAL has given the corporation permission to continue to treat grants as income.

Grants that relate to specific capital expenditure are treated as deferred income which is then credited to the income and expenditure account over the related asset's useful life. Other grants are credited to the statement of financial activities when received.

Pension scheme

The corporation provides pension benefits to its employees by participating in the Northern Ireland Local Government Officers' Superannuation Committee (NILGOSC) Pension Scheme, which is a defined benefit scheme. Annual contributions to the NILGOSC scheme are based on actuarial advice. The operating costs of providing retirement benefits to the corporation's employees are recognised in accounting periods in which the benefits are earned by employees, and the related finance costs and other changes in value of the assets and liabilities are recognised in the period in which they arise.

Fund accounting

The corporation has various types of funds for which it is responsible, and which require separate disclosure. These are as follows:

Restricted funds

Grants or donations received which are earmarked by the donor for specific purposes. Such purposes are within the overall aims of the organisation.

Unrestricted funds

Funds which are expendable at the discretion of the Governors in furtherance of the objectives of the corporation. In addition to expenditure on the provision of services, such funds may be held in order to finance capital investment and working capital.

Armagh Observatory

2 Incoming Resources

The accounts reflect the receipt of the following grants:

Grants from the Department of Culture, Arts and Leisure (DCAL)

	Unrestricted funds 2010 £	Restricted funds 2010 £	Total funds 2010 £	Total funds 2009 £
Recurrent grant	817,000	-	817,000	817,000
In-year recurrent grant	105,000	-	105,000	60,000
In-year recurrent grant - CPD fees/archive materials	15,000	-	15,000	4,000
In-year recurrent grant from the Armagh Planetarium	-	-	-	5,000
Capital grant	-	28,312	28,312	25,000
In-year capital grant	-	60,000	60,000	43,000
	937,000	88,312	1,025,312	954,000

Other grants and receipts

	Unrestricted funds 2010 £	Restricted funds 2010 £	Total funds 2010 £	Total funds 2009 £
STFC Research, Visitor and Travel grants	-	253,493	253,493	181,554
Miscellaneous travel grants	-	2,658	2,658	5,484
The Royal Society	-	-	-	6,720
Leverhulme Trust	-	51,117	51,117	13,400
Discover Science and Engineering Programme:				
- IYA 2009 activities	-	16,595	16,595	22,090
- Light Pollution Conference	-	5,385	5,385	5,324
- Astroart Fun project	-	2,155	2,155	-
Light Pollution Conference registration fees	-	2,482	2,482	-
Trinity College Dublin (IHY 2007 - 2009)	-	-	-	8,000
Joint Collection Management and Public Access project with the Armagh Public Library	-	2,808	2,808	-
European Commission FP7 EuroPlaNet project	-	9,840	9,840	-
Other grants and receipts	-	200	200	200
	-	346,733	346,733	242,772

3 Direct expenditure of the corporation

	Unrestricted funds 2010 £	Restricted funds 2010 £	Total funds 2010 £	Total funds 2009 £
Salaries and wages	676,870	127,847	804,717	718,892
Student maintenance grants	95,379	15,018	110,397	98,735
Scholarship and training	13,230	2,785	16,015	8,715
Travelling and subsistence	31,044	42,623	73,667	67,372
Technical maintenance	3,959	-	3,959	4,303
Computer consumables	15,283	3,829	19,112	13,439
Library and publications	36,396	-	36,396	29,899
Archive materials and services	19,975	-	19,975	5,579
Northern Ireland Regional Area Network	22,665	-	22,665	25,621
Contribution to UKSC and SALT operating costs	7,000	-	7,000	4,200
Meetings and conferences	1,331	-	1,331	4,216
Visitor programme	2,998	-	2,998	4,354
Public Understanding of Science expenses	546	-	546	3,632
Atomic Data & Analysis Structure subscription	-	2,074	2,074	1,318
International Year of Astronomy 2009 expenses	-	3,678	3,678	2,904
Light Pollution Conference	-	6,928	6,928	-
	926,676	204,782	1,131,458	993,179

Armagh Observatory

4 Fundraising and publicity

	Unrestricted funds 2010 £	Restricted funds 2010 £	Total funds 2010 £	Total funds 2009 £
	-	-	-	-

5 Travel and subsistence

Restricted travel and subsistence is funded in the main from external grant aid from the Science and Technology Facilities Council (STFC).

6 Management and administration of the corporation

	Unrestricted funds 2010 £	Restricted funds 2010 £	Total funds 2010 £	Total funds 2009 £
Insurance	12,567	-	12,567	9,132
Heat, light and power	35,592	-	35,592	31,413
Property and grounds maintenance	25,670	-	25,670	26,939
Grounds agency staff costs	17,067	-	17,067	15,968
Cleaning consumables	1,160	-	1,160	759
Cleaning agency staff costs	5,912	-	5,912	5,158
Postage and telephone	4,037	-	4,037	4,276
Recruitment costs	1,797	-	1,797	519
General expenses	7,119	-	7,119	5,742
Management Committee	1,766	-	1,766	1,638
Office and miscellaneous equipment	4,904	-	4,904	5,600
Bank charges	20	-	20	37
Audit	9,777	-	9,777	6,557
Professional fees - property	11,630	-	11,630	1,382
Other professional fees	2,906	-	2,906	8,402
Stationery, printing and advertising	1,857	-	1,857	2,326
Depreciation	-	116,906	116,906	112,171
Release from grants reserve	-	(87,379)	(87,379)	(82,644)
Release from donated asset reserve	-	(29,527)	(29,527)	(29,527)
	143,781	-	143,781	125,848

Armagh Observatory

7 Average staff numbers and related costs

Average staff numbers

	2010	2009
	Number	Number
Permanent staff	14.0	14.0
Fixed-term contract staff	4.5	3.5
Agency staff	1.2	1.2
	19.7	18.7

Included within permanent staff numbers is the corporation's Administrator whose salary is apportioned on a 50:50 basis between the Observatory and Planetarium.

Costs

	2010	2009
	£	£
Permanent staff		
Wages and salaries	536,173	511,373
Social security costs	42,040	40,343
Pension service cost	98,657	73,353
	676,870	625,069
Fixed-term contract staff costs		
Wages and salaries	110,006	82,480
Social security costs	10,498	7,581
Pension service cost	7,343	3,762
	127,847	93,823
Total permanent and fixed-term contract staff		
Wages and salaries	646,179	593,853
Social security costs	52,538	47,924
Pension service cost (note 20)	106,000	77,115
	804,717	718,892
Agency staff costs	22,979	21,126
Total staff costs	827,696	740,018

Permanent staff costs include 50% of the salary costs of the corporation's Administrator.

The pension service cost of £106,000 is the actuarial present value of pension benefits earned by staff during the year.

Average student numbers and related costs

	2010	2009
	Number	Number
PhD students	9.5	8
	2010	2009
	£	£
Student maintenance grants	110,397	98,735

There was 1 additional PhD student in the year whose maintenance grant was funded by the STFC

Armagh Observatory

8 Income and expenditure summary

	2010 £	2009 £
Gross income	1,260,908	1,121,501
Expenditure		
Direct expenditure of the corporation (note 3)	1,131,458	993,179
Fund raising and publicity (note 4)	-	-
Management and administration of the corporation (note 6)	143,781	125,848
	1,275,239	1,119,027
Other finance income	(53,000)	4,000
(Deficit)/surplus for the year	(67,331)	6,474

9 Tangible fixed assets

	Freehold Land & buildings £	Exhibits and grounds £	Astropark £	Furniture Fittings £	Office Eqpt. £	Equipment & Historic telescopes £	Total £
Cost or valuation							
At 1 April 2009	4,038,688	23,593	367,490	68,322	35,240	549,382	5,082,715
Additions	50,000	-	-	5,251	-	30,680	85,931
Disposals	-	-	-	-	-	(14,761)	(14,761)
At 31 March 2010	4,088,688	23,593	367,490	73,573	35,240	565,301	5,153,885
Depreciation							
At 1 April 2009	773,431	7,645	257,247	62,316	27,238	334,860	1,462,737
Charge for year	47,016	1,871	18,375	1,127	1,816	46,701	116,906
Disposals	-	-	-	-	-	(14,761)	(14,761)
At 31 March 2010	820,447	9,516	275,622	63,443	29,054	366,800	1,564,882
Net book value							
At 31 March 2010	3,268,241	14,077	91,868	10,130	6,186	198,501	3,589,003
Net book value							
At 31 March 2009	3,265,257	15,948	110,243	6,006	8,002	214,522	3,619,978

Tangible fixed asset additions of £85,931 as shown above were funded as follows:

	£	
DCAL	Capital grant	28,312
DCAL	In-year capital grant	55,250
STFC	Research grants	1,066
Leverhulme Trust	Research grant	1,303
		85,931

If the land and buildings had not been valued, they would have been included at the following amounts:

	2010 £	2009 £
Cost	709,419	659,419
Aggregate depreciation	(175,442)	(160,601)
Net book value based on historic cost	533,977	498,818

Depreciation on fixed assets for the year was £116,906 (2009: £112,172).

Land and buildings include grounds and buildings with a net book value of £2,518,561 at 31 March 2010 which were donated to the corporation in 1790 by Archbishop Richard Robinson, the founder of the corporation.

Armagh Observatory

10 Debtors

	2010 £	2009 £
Grant debtors	20,316	44,191
Prepayments	47,857	42,392
Sundry debtors	278	197
Pension scheme	455	-
	68,906	86,780

11 Creditors: amounts falling due within one year

	2010 £	2009 £
Trade creditors	20,979	9,693
Accruals	93,963	21,702
Deferred income	91,456	56,329
	206,398	87,724

Analysis of deferred income

	2010 £	2009 £
Balance at 1 April	56,329	46,501
Transfer to statement of financial activities	(24,723)	(29,747)
Transfer from statement of financial activities	59,850	39,575
Balance at 31 March	91,456	56,329

12 Government grants reserve

	Land and buildings £	Exhibits and grounds £	Astropark £	Furniture Fittings £	Office Eqpt. £	Equipment & Historic telescopes £	Total £
Balance at 1 April	362,554	8,897	110,243	6,005	8,004	214,432	710,135
Additions	50,000	-	-	5,251	-	30,680	85,931
Amortised	(17,489)	(1,871)	(18,375)	(1,127)	(1,816)	(46,701)	(87,379)
Balance at 31 March	395,065	7,026	91,868	10,129	6,188	198,411	708,687

Armagh Observatory

13 Unrestricted funds

	2010
	£
Balance at 1 April	(566,977)
Incoming resources	1,056,126
Resources expended	(1,070,457)
Other finance income	(53,000)
Adjustment to the statement of recognised gains and losses	(727,000)
Balance at 31 March	(1,361,308)

The unrestricted funds include a deficit of £1,444,000 (2009: £649,000) in respect of pension scheme liabilities of the pension fund.

It is the policy of the Armagh Observatory to retain a reasonable level of unrestricted cash funds for future cash needs to fund salary and other costs of research grants, which are normally paid in arrears, and to provide a contingency fund for development opportunities and possible exceptional expenditure.

The Observatory considers that funds of between £50,000 and £100,000, approximately 5% of total annual expenditure are sufficient to meet financial risks. The level of unrestricted funds at 31 March 2010 of £82,237 is currently sufficient to meet foreseeable contingencies.

This policy will be reviewed by the Director on an annual basis at the end of the financial year.

Unrestricted funds after reversal of the pension adjustments are as follows:

	£
Unrestricted funds at 31 March 2010	
Balance on unrestricted funds at 31 March 2010	(1,361,308)
Reversal of pension scheme debtor	(455)
Reversal of pension scheme liability	1,444,000
Unrestricted funds at 31 March 2010 after reversal of pension adjustments	82,237

Armagh Observatory

14 Restricted funds

	Balance 1/4/2009	Incoming resources	Resources expended	Transfer between funds	Transfer from defrd. income	Transfer to defrd. income	Balance 31/3/2010
	£	£	£	£	£	£	£
DCAL grants							
SALT	5,031	-	-	-	-	-	5,031
Capital	-	28,312	(28,312)	-	-	-	-
In-year capital grant	-	60,000	(55,251)	-	-	(4,749)	-
	5,031	88,312	(83,563)	-	-	(4,749)	5,031
Other grants							
STFC grants	-	253,493	(139,170)	(105,276)	4,709	(13,756)	-
Discover Science and Engineering Programme: IYA 2009 and Astroart Fun	-	18,750	(24,968)	-	11,774	(5,556)	-
Light Pollution & Dark Skys Symposium	-	7,867	(10,185)	-	5,264	(2,946)	-
Leverhulme Trust	-	51,117	(27,193)	(921)	-	(23,003)	-
Lindsay Scholarship Fund	2,037	-	-	-	-	-	2,037
Miscellaneous travel grants	-	2,658	(2,658)	-	-	-	-
The Royal Society	-	-	(2,976)	-	2,976	-	-
European Commission FP7 EuroPlaNet project	-	9,840	-	-	-	(9,840)	-
Joint Collection Management and Public Access project - Armagh Public Library	-	2,808	-	(2,808)	-	-	-
Miscellaneous grants	-	200	-	(200)	-	-	-
	2,037	346,733	(207,150)	(109,205)	24,723	(55,101)	2,037
Donations	225	-	-	-	-	-	225
	7,293	435,045	(290,713)	(109,205)	24,723	(59,850)	7,293

DCAL Grants

The Observatory received capital grant of £28,312 and a further in-year capital grant of £60,000 from the DCAL during the year for expenditure on the Variable Star Telescope dome and works to build the dome base, additional air-conditioning for the Bungalow computer room and additional equipment.

Other Grants and Receipts

The Observatory received funding from the STFC to fund a number of research projects during the year:

- A Fresh Look at the Sun: New Opportunities with the Launch of Solar-B.
- The contribution of plasma jets and sporadic radiative events to the coronal heating puzzle.
- The mass loss and death of massive stars.

Funding was received from the Leverhulme Trust for a research project ; Ultracool Dwarfs: A New Class of Stellar Lighthouse.

These grants fund salary, travel and other direct costs of the research projects and provide a contribution towards the principal investigator's salary costs and indirect and estate costs.

Armagh Observatory

15 Analysis of transfer between funds

The transfer from restricted to unrestricted funds represents funds received from the STFC and other grants towards grant supervisory salary costs and other general running costs of the Observatory.

16 Designated funds

	2010 £	2009 £
Revaluation of land and buildings		
Balance at 1 April	340,677	340,677
Transfer to donated assets reserve	-	-
Revaluation of land and buildings	-	-
Balance at 31 March	340,677	340,677
Donated assets reserve		
Balance at 1 April	2,553,446	2,582,973
Transfer from revaluation of land and buildings	-	-
Revaluation of donated land and buildings	-	-
Amortised	(29,527)	(29,527)
Balance at 31 March	2,523,919	2,553,446
Total designated funds at 31 March	2,864,596	2,894,123

Buildings and grounds with a net book value at 31 March 2010 of £2,518,561 (2009: £2,547,195) were donated to the corporation in 1790 by Archbishop Richard Robinson, the founder of the corporation.

The corporation's land and buildings were revalued at 31 March 2007 by Land & Property Services (formerly the Valuation & Lands Agency), an Agency within the Department of Finance and Personnel on the following bases:

Land and buildings	Basis of valuation
Operational land and buildings which are unique due to their specialised nature and design	depreciated replacement cost
Operational non-specialised land and buildings	existing use value
Other land and buildings	market value

17 Analysis of net assets between funds

	Designated Funds £	Unrestricted Funds £	Restricted Funds £	Total Funds £
Tangible assets	3,581,710	-	7,293	3,589,003
Current assets	-	280,663	-	280,663
Current liabilities	-	(206,398)	-	(206,398)
Pension liability	-	(1,444,000)	-	(1,444,000)
Net assets/(liabilities)	3,581,710	(1,369,735)	7,293	2,219,268

18 Analysis of net funds

	1 April 2009 £	Cash Flow £	31 March 2010 £
Cash at bank and in hand	62,496	15,664	78,160
Liquid resources	12,044	121,553	133,597
Net funds	74,540	137,217	211,757

Liquid resources comprise short term deposits held at the bank.

Armagh Observatory

19 Reconciliation of net cash flow to movement in net funds

	2010	2009
	£	£
Increase in cash in financial year	15,664	28,768
Increase/(decrease in deposits)	121,553	(46,263)
Increase/(decrease) in net funds in the year	137,217	(17,495)
Net funds at 1 April	74,540	92,035
Net funds at 31 March	211,757	74,540

20 Pension scheme

An actuarial valuation of the NILGOSC scheme was carried out at 31 March 2007. The funding level (ratio of assets to past service liabilities) at 31 March 2007 was 89% compared to 85% at 31 March 2004 corresponding to a funding deficit of £396 million, which will have to be recovered by increasing employers' contribution rates. The employers' contribution rate for 2009/2010 of 16% will increase to 17% in 2010/2011 and it is anticipated that there will be further increases in subsequent years.

The NILGOSC actuary, Hymans Robertson LLP, has provided the following details for the purposes of accounting for the Observatory's share of the scheme deficit in accordance with FRS 17.

Financial assumptions

	31/3/2010	31/3/2009	31/3/2008
Rate of increase in salaries	5.3%	4.6%	5.1%
Inflation/pension increase	3.8%	3.1%	3.6%
Discount rate	5.5%	6.9%	6.9%
Expected return on assets	7.2%	6.5%	7.3%

Mortality assumptions

	2010	2009
	Years	Years
Longevity at age 65 for current pensioners:		
- Men	20.8	19.6
- Women	24.1	22.5
Longevity at age 65 for future pensioners:		
- Men	22.3	20.7
- Women	25.7	23.6

The fair value of assets in the scheme and expected rates of return

	Long term rate of return 31/3/2010 %	Value at 31/3/2010 £k	Long term rate of return 31/3/2009 %	Restated Value at 31/3/2009 £k	Long term rate of return 31/3/2008 %	Value at 31/3/2008 £k
Equities	7.8%	2,168	7.0%	1,424	7.7%	2,006
Bonds	5.0%	394	5.4%	273	5.7%	293
Property	5.8%	169	4.9%	137	5.7%	205
Cash	4.8%	84	4.0%	117	4.8%	39
		2,815		1,951		2,543

Asset values at 31 March 2010 are at bid values as required under FRS 17.

Armagh Observatory

Scheme balance sheet

	31/3/2010	31/3/2009
	£k	£k
Fair value of assets	2,815	1,951
Present value of scheme liabilities:		
Present value of unfunded liabilities	-	-
Present value of funded liabilities	(4,259)	(2,600)
Total value of scheme liabilities	(4,259)	(2,600)
Deficit in the scheme	(1,444)	(649)

Analysis of amount charged to operating profit in respect of the scheme

	Year to 31/3/2010	Year to 31/3/2009	Year to 31/3/2008
	£k	£k	£k
Current service cost	73	79	115
Past service cost	33	-	-
	106	79	115

Analysis of amount charged to other finance expenses

	Year to 31/3/2010	Year to 31/3/2009	Year to 31/3/2008
	£k	£k	£k
Expected return on scheme assets	128	186	182
Interest on scheme liabilities	(181)	(182)	(161)
Net return	(53)	4	21

Recognition in the statement of financial activities

	Year to 31/3/2010	Year to 31/3/2010	Year to 31/3/2009	Year to 31/3/2009
	£k	%	£k	%
Current service costs	73	13.3%	79	14.7%
Past service costs/(gains)	33	6.0%	-	-
Interest costs	181	33.0%	182	33.8%
Expected return on assets	(128)	(23.4%)	(186)	(34.6%)
Total	159		75	14.0%
Actual return on assets	821		(591)	

Reconciliation of defined benefit obligation

	Year to 31/3/2010	Year to 31/3/2009
	£k	£k
Opening defined benefit obligation	2,600	2,642
Current service cost	73	79
Interest cost	181	182
Contributions by members	39	32
Actuarial losses/(gains)	1,419	(229)
Past service costs/(gains)	33	-
Benefits paid	(86)	(106)
Closing defined benefit obligation	4,259	2,600

Armagh Observatory

Reconciliation of fair value of assets

	Year to 31/3/2010	Year to 31/3/2009
	£k	£k
Opening fair value of assets	1,951	2,543
Expected return on assets	128	186
Contributions by members	39	32
Contributions by the corporation	91	81
Actuarial gains/(losses)	692	(785)
Benefits paid	(86)	(106)
Closing fair value of assets	2,815	1,951

Amount for current and previous accounting years

	Year to 31/3/2010	Year to 31/3/2009	Year to 31/3/2008	Year to 31/3/2007	Year to 31/3/2006
	£k	£k	£k	£k	£k
Fair value of assets	2,815	1,951	2,543	2,543	2,472
Present value of defined benefit obligation	(4,259)	(2,600)	(2,642)	(2,965)	(2,540)
Surplus/(deficit)	(1,444)	(649)	(99)	(422)	(68)
Experience gains/(losses) on assets	692	(785)	(189)	(30)	377
Experience gains/(losses) on liabilities	-	-	106	1	(1)

Amount recognised in the statement of recognised gains and losses (SRGL)

	Year to 31/3/2010	Year to 31/3/2009	Year to 31/3/2008	Year to 31/3/2007	Year to 31/3/2006
	£k	£k	£k	£k	£k
Actuarial gains/(losses)	(727)	(546)	341	(346)	129
Increase/(decrease) in irrecoverable surplus from membership fall and other factors	-	-	-	-	-
Actuarial gains/(losses) recognised in the SRGL	(727)	(546)	341	(346)	129
Cumulative actuarial gains/(losses)	(1,094)	(367)	179	(162)	184

21 Commitments

There were no outstanding capital commitments at 31 March 2010 (2009: £nil).

22 Investment in Southern African Large Telescope Project

	2010	2009
	£	£
Total investment at 31 March	185,096	185,096
Provision for impairment at 31 March	(185,096)	(185,096)
Net book value at 31 March	-	-

The Southern African Large Telescope (SALT) project involved the construction of a 10-metre class telescope with related buildings at the Sutherland Outstation of the South African Astronomical Observatory in Northern Cape Province. The main objective is to advance science and education in South Africa through the promotion of deep-sky astronomy, and by participating in the project the Armagh Observatory has attained rights to use the telescope.

Armagh Observatory

23 Related-Party Transactions

None of the members of the Board of Governors, the Management Committee, the Director or other related parties have undertaken any material transactions with the Armagh Observatory during the year. The Armagh Observatory has had various material transactions with a number of Government Departments, Executive Agencies and Non-Departmental Public Bodies in Northern Ireland and the UK. Most of these transactions have been with the Department of Culture, Arts and Leisure (DCAL), the Central Procurement Directorate (CPD), the Science and Technology Facilities Council (STFC) and the Southern Education and Library Board (SELB). The DCAL provides recurrent and capital grants (page 36, note 2), the STFC provides grants for research projects (page 36, note 2) and the CPD and the SELB are the Centres of Procurement Expertise for the corporation.

24 Financial Instruments

As the cash requirements of the Observatory are met through grants from the Department of Culture, Arts and Leisure and other grant funding bodies, financial instruments play a more limited role in creating risk than would apply to a non-public sector body of a similar size. The majority of financial instruments relate to contracts to buy non-financial items in line with the Observatory's expected purchase and usage requirements and the Observatory is therefore exposed to little credit, liquidity or market risk.

25 Contingent Liability

There is an unresolved issue concerning whether the agreement on Equal Pay reached by the Northern Ireland Civil Service (NICS) Management and the Trade Union Side in December 2009 applies to Armagh Observatory staff on the same pay scales as those NICS staff covered by the agreement. The agreement comprises an increase in pay scales from 1 February 2009 and a settlement payment depending on service in the period from 1 February 2003 to 31 January 2009.

The Armagh Observatory is bound to follow NICS pay scales and accordingly the cost of implementing the new pay scales back to February 2009 amounting to £12,800 has been included in the accounts as an accrual pending the receipt of permission from the DCAL to proceed with the implementation of the revised pay scales. The potential liability for the payment of the settlement, estimated at £46,000 at 31 March 2010 has been treated as a contingent liability pending further clarification of the issue.

26 Additional disclosures to comply with the Financial Reporting Manual (FRoM)

FRoM requires non-departmental public bodies to regard grant-in-aid received as contributions from controlling bodies giving rise to a financial interest in the residual interest of the body and hence accounting for as financing, that is by crediting them to income and expenditure reserve. In addition FRoM requires grant-in-aid to be accounted for on a cash basis.

However, as the corporation is required to prepare accounts in accordance with the SORP for charities, the DCAL has given the corporation permission to continue to treat grants as income. If the Observatory were required to comply with the FRoM the result of this compliance would be as follows:

Statement of Financial Activities prepared under FRoM

	2010	2009
	£	£
Incoming resources		
Incoming resources from research and other non-DCAL grants	316,355	231,038
Other incoming resources	9,921	11,507
Total incoming resources	326,276	242,545
Resources expended		
Direct expenditure of the corporation	1,131,458	993,179
Fundraising and publicity	-	-
Management and administration of the corporation	143,781	125,848
Capital expenditure	85,931	76,950
Notional cost of capital	3,267	26,908
Total Resources expended	1,364,437	1,222,885
Net deficit for the year	(1,038,161)	(980,340)
Credit in respect of notional cost of capital	3,267	26,908
Finance (costs)/income - pension scheme	(53,000)	4,000
Actuarial loss - pension scheme	(727,000)	(556,000)
Amount transferred to funds	(1,814,894)	(1,505,432)

Armagh Observatory

Analysis of funds prepared under the FReM

	2010	2009
	£	£
Balance at 1 April	3,046,580	3,629,322
Adjustment to opening funds	-	3,912
Movement in government grant reserve	(1,448)	(5,695)
Movement in designated funds	(29,527)	(29,527)
Grant-in-aid received in the year	1,025,312	954,000
Net operating costs for the year	(1,814,894)	(1,505,432)
Balance at 31 March	2,226,023	3,046,580

The closing deferred income balance of £2,226,023 represents the closing balance of funds brought forward under SORP accounting rules and £6,755 of DCAL income deferred at the year-end.

Armagh Planetarium

Statement of financial activities for the year ended 31 March 2010

		Unrestricted funds 2010	Restricted funds 2010	Total funds 2010	Total funds 2009 Restated
	Notes	£	£	£	£
Incoming resources					
DCAL grants	2	483,000	21,604	504,604	548,975
Other grants and receipts	2	260	23,900	24,160	9,365
Admissions		143,953	-	143,953	130,239
Rents		2,600	-	2,600	2,600
Interest receivable		13	-	13	20
Disposal of fixed assets		-	-	-	2,334
Miscellaneous income		4,091	-	4,091	7,650
Outreach income		11,630	-	11,630	11,839
Shop and mail order gross profit	22	33,145	-	33,145	18,197
Transfer to deferred income		-	(5,365)	(5,365)	(4,035)
Transfer from deferred income		-	-	-	766
Transfer between funds		-	-	-	-
Total incoming resources		678,692	40,139	718,831	727,950
Resources expended					
Direct expenditure of the corporation	3	477,456	18,535	495,991	458,134
Fundraising and publicity	4	22,671	-	22,671	44,868
Management and administration of the corporation	5	160,454	-	160,454	158,771
Capital expenditure		-	21,604	21,604	67,741
Total resources expended		660,581	40,139	700,720	729,514
Net incoming/(outgoing) resources for the year before cost of capital					
		18,111	-	18,111	(1,564)
Cost of capital		-	(169,402)	(169,402)	(191,636)
Net movement in funds after cost of capital		18,111	(169,402)	(151,291)	(193,200)
Cost of capital reversed			169,402	169,402	191,636
Net movement in funds before finance income		18,111	-	18,111	(1,564)
Finance income/(costs) - pension scheme		(35,000)	-	(35,000)	(6,000)
Net movement in funds after finance income		(16,889)	-	(16,889)	(7,564)
Actuarial (loss)/gain on pension scheme		(655,000)	-	(655,000)	(272,000)
Net movement in funds after actuarial (loss)/gain		(671,889)	-	(671,889)	(279,564)
Balances brought forward at 1 April		(448,219)	-	(448,219)	(168,655)
Balances carried forward at 31 March	13, 14	(1,120,108)	-	(1,120,108)	(448,219)

All amounts above relate to continuing operations of the corporation.

The income and expenditure summary is included at Note 7.

Cost of capital at 3.5% has been charged on the average net assets of the corporation.

As this is a notional charge the cost of capital is reversed in the Statement of Financial Activities.

Statement of recognised gains and losses

	2010	2009
	£	£
Net movement in funds for the year	(16,889)	(7,564)
Surplus on revaluation of land and buildings	-	-
Net movement on government grant reserve	(187,960)	(131,124)
Actuarial (loss)/gain on pension scheme	(655,000)	(272,000)
Recognised gains/((losses) for the year	(859,849)	(410,688)

Armagh Planetarium

Balance sheet at 31 March 2010

	Notes	2010 £	2009 £
Tangible assets	8	5,530,230	5,718,190
Current assets			
Stock	9	11,217	11,544
Debtors and prepayments	10	27,879	36,524
Cash at bank and in hand	17, 18	51,378	30,292
		90,474	78,360
Creditors: amounts falling due within one year	11	(74,582)	(72,579)
Net current assets		15,892	5,781
Net assets excluding pension liability		5,546,122	5,723,971
Long-term liabilities - pension scheme	19	(1,136,000)	(454,000)
		(1,136,000)	(454,000)
Net assets		4,410,122	5,269,971
Funds			
Unrestricted funds	13	(1,120,108)	(448,219)
Government grant reserve	12	894,149	1,082,109
Designated funds	15	4,636,081	4,636,081
		4,410,122	5,269,971

The financial statements on pages 49 to 63 were approved on 9 July 2010 and were signed by:

Dr Tom Mason MBE, Accounting Officer for the Armagh Planetarium

Armagh Planetarium

Cash flow statement for the year ended 31 March 2010

	Notes	2010 £	2009 £
Net cashflow from operating activities		23,990	(35,161)
Returns on investments and servicing of finance			
Interest received		13	20
Profit in sale of assets		-	2,334
Bank and credit card processing charges		(2,917)	(3,767)
		(2,904)	(1,413)
Capital expenditure			
Purchase of tangible assets		(21,604)	(67,741)
Capital grants received		21,604	67,741
		-	-
Net cash inflow/(outflow) before financing		21,086	(36,574)
Financing			
Repayment of principal under hire purchase agreements		-	-
Increase/(decrease) in cash	17, 18	21,086	(36,574)

Reconciliation of operating result to net cash flow from operating activities

	2010 £	2009 £
Net incoming resources per statement of financial activities	18,111	(1,564)
Interest received	(13)	(20)
Profit on sale of assets	-	(2,334)
Interest paid and similar charges	2,917	3,767
Depreciation	209,564	198,865
Deferred credit release	(209,564)	(198,865)
Pension service costs	(8,000)	1,000
Decrease/(increase) in stock	327	(2,266)
Decrease/(increase) in debtors	8,645	(14,151)
Increase/(decrease) in creditors	2,003	(19,593)
Net cash (outflow)/inflow from operating activities	23,990	(35,161)

Armagh Planetarium

Notes to the financial statements for the year ended 31 March 2010

1 Accounting policies

These financial statements are prepared on the going concern basis under the historical cost convention, as modified by the revaluation of certain tangible fixed assets, and in accordance with The Audit and Accountability (Northern Ireland) Order 2003, and directions made thereunder by the Department of Culture, Arts and Leisure and applicable accounting standards. The principal accounting policies are set out below.

Tangible fixed assets

The cost of tangible fixed assets is their replacement or valuation together with any incidental costs of acquisition. Depreciation is calculated so as to write off the cost or valuation of tangible fixed assets, less their estimated residual values, on a straight-line basis over the expected useful economic lives of the assets concerned. Land is not depreciated.

The principal annual rates used are as follows:

	%
Digistar	10
Furniture and fittings	10 - 15
Office equipment	15 - 25
Equipment	10 - 25
Buildings	2 - 3
Exhibits	10 - 25
Vehicles	25

Land and buildings are included in the balance sheet at depreciated replacement cost, estimated value in use or market value.

Government grants

The Government Financial Reporting Manual requires that grants are to be shown as a movement in reserves rather than as income. However, as the corporation is required to prepare accounts in accordance with the SORP for charities, the DCAL has given the corporation permission to continue to treat grants as income.

Grants that relate to specific capital expenditure are treated as deferred income which is then credited to the income and expenditure account over the related asset's useful life. Other grants are credited to the statement of financial activities when received.

Pension scheme

The corporation provides pension benefits to its employees by participating in the Northern Ireland Local Government Officers' Superannuation Committee (NILGOSC) Pension Scheme, which is a defined benefit scheme. Annual contributions to the NILGOSC scheme are based on actuarial advice. The operating costs of providing retirement benefits to the corporation's employees are recognised in accounting periods in which the benefits are earned by employees, and the related finance costs and other changes in value of the assets and liabilities are recognised in the period in which they arise.

Armagh Planetarium

Fund accounting

The corporation has various types of funds for which it is responsible, and which require separate disclosure. These are as follows:

Restricted funds

Grants or donations received which are earmarked by the donor for specific purposes. Such purposes are within the overall aims of the organisation.

Unrestricted funds

Funds which are expendable at the discretion of the Governors in furtherance of the objects of the corporation. In addition to expenditure on the provision of services, such funds may be held in order to finance capital investment and working capital.

Stocks

Stocks are stated at the lower of cost and net realisable value. In general, cost is determined on a first in first out basis. Provision is made, where necessary for obsolete, slow moving and defective stocks.

2 Incoming Resources

The accounts reflect the receipt of the following grants:

Grants from the Department of Culture, Arts and Leisure (DCAL)

	Unrestricted funds 2010 £	Restricted funds 2010 £	Total funds 2010 £	Total funds 2009 £
Recurrent grant	483,000	-	483,000	483,000
Recurrent grant transferred in-year to Armagh Observatory	-	-	-	(5,000)
In-year recurrent grant - actuary's fees	-	-	-	4,000
Capital grant	-	21,604	21,604	25,000
In-year capital grant	-	-	-	41,975
	483,000	21,604	504,604	548,975

Other grants and receipts

	Unrestricted funds 2010 £	Restricted funds 2010 £	Total funds 2010 £	Total funds 2009 £
Friends of the Planetarium	260	-	260	1,375
Discover Primary Science	-	2,200	2,200	2,490
Ultach	-	6,000	6,000	-
Naiscoil Ard Mhacha	-	9,700	9,700	-
STFC	-	6,000	6,000	-
North Eastern Education and Library Board - IYA 2009	-	-	-	3,000
The Royal Society Local Heroes Grants Scheme - Bell Burnell	-	-	-	2,500
	260	23,900	24,160	9,365

Armagh Planetarium

3 Direct expenditure of the corporation

	Unrestricted funds 2010 £	Restricted funds 2010 £	Total funds 2010 £	Total funds 2009 £
Salaries and wages	343,544	-	343,544	346,289
Agency staff	9,586	-	9,586	-
Equipment leasing	1,180	-	1,180	1,180
Travelling and subsistence	8,406	-	8,406	17,052
Equipment maintenance and consumables	71,220	-	71,220	37,858
Library and subscriptions	6,438	-	6,438	5,734
Production expenses	12,611	11,436	24,047	9,875
Exhibitions and events	13,059	7,099	20,158	33,666
Training	3,689	-	3,689	895
Website design	-	-	-	2,000
Vehicle expenses	7,723	-	7,723	3,585
	477,456	18,535	495,991	458,134

4 Fundraising and publicity

	Unrestricted funds 2010 £	Restricted funds 2010 £	Total funds 2010 £	Total funds 2009 £
Advertising and brochures	22,286	-	22,286	44,304
Hospitality	385	-	385	564
	22,671	-	22,671	44,868

5 Management and administration of the corporation

	Unrestricted funds 2010 £	Restricted funds 2010 £	Total funds 2010 £	Total funds 2009 £
Insurance	18,078	-	18,078	15,964
Heat, light and power	45,736	-	45,736	51,182
General property repairs	21,681	-	21,681	20,427
Cleaning services and consumables	20,339	-	20,339	15,949
Office and café furnishings	1,910	-	1,910	542
Postage and telephone	13,544	-	13,544	13,804
General expenses	499	-	499	933
Bank and credit card processing charges	2,917	-	2,917	3,767
Audit	9,001	-	9,001	6,388
Professional fees and licences	8,883	-	8,883	12,481
Management Committee and meetings	1,634	-	1,634	1,817
Rates	175	-	175	-
Printing and stationery	14,074	-	14,074	15,517
Recruitment	1,915	-	1,915	-
Bad debts	68	-	68	-
Depreciation	-	209,564	209,564	198,865
Release from grants reserve	-	(209,564)	(209,564)	(198,865)
Losses and special payments	-	-	-	-
	160,454	-	160,454	158,771

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6 Average staff numbers and related costs

Average staff numbers

	2010	2009
	Number	Number
Permanent staff	6.5	6.5
Fixed-term contract staff	3.5	4.3
Agency staff	0.5	-
	10.5	10.8

Costs

	2010	2009
	£	£
Permanent staff		
Wages and salaries	222,786	211,031
Social security costs	16,337	10,041
Pension service cost	25,988	33,062
	265,111	254,134
Fixed-term contract staff costs		
Wages and salaries	68,305	77,013
Social security costs	4,116	4,786
Pension service cost	6,012	10,356
	78,433	92,155
Total permanent and fixed-term staff		
Wages and salaries	291,091	288,044
Social security costs	20,453	14,827
Pension service cost	32,000	43,418
	343,544	346,289
Agency staff costs	9,586	-
Total staff costs	353,130	346,289

Staff costs relating to the corporation's Administrator are apportioned on a 50:50 basis between the Observatory and Planetarium.

The pension service cost of £32,000 is the actuarial present value of pension benefits earned by staff during the year.

7 Income and expenditure summary

	2010	2009
	£	£
Gross income	697,227	660,209
Expenditure		
Direct expenditure of the corporation	495,991	458,134
Fund raising and publicity	22,671	44,868
Management and administration of the corporation	160,454	158,771
	679,116	661,773
Other finance income	(35,000)	(6,000)
(Deficit)/surplus for the year	(16,889)	(7,564)

Armagh Planetarium

8 Tangible fixed assets

	Digistar £	Freehold Land and buildings £	Equipment £	Exhibits £	Vehicles £	Total £
Cost or valuation						
At 1 April 2009	906,054	5,733,408	336,588	147,997	8,702	7,132,749
Additions	-	-	21,604	-	-	21,604
Disposals	-	-	-	-	-	-
At 31 March 2010	906,054	5,733,408	358,192	147,997	8,702	7,154,353
Depreciation						
At 1 April 2009	714,534	423,713	186,619	80,991	8,702	1,414,559
Charge for year	37,067	120,253	25,390	26,854	-	209,564
Disposals	-	-	-	-	-	-
At 31 March 2010	751,601	543,966	212,009	107,845	8,702	1,624,123
Net book value						
At 31 March 2010	154,453	5,189,442	146,183	40,152	-	5,530,230
Net book value						
At 31 March 2009	191,520	5,309,695	149,969	67,006	-	5,718,190

Tangible fixed asset additions of £21,604 as shown above were funded as follows:

	£
DCAL capital grant	21,604

If land and buildings had not been revalued, they would have been included at the following amounts:

	2010 £	2009 £
Cost	1,321,239	1,321,239
Aggregate depreciation	(369,550)	(344,465)
Net book value based on historic cost	951,689	976,774

9 Stocks

	2010 £	2009 £
Finished goods and goods for resale	11,217	11,544

10 Debtors

	2010 £	2009 £
Trade and grant debtors	1,982	14,706
Sundry debtors	-	-
Prepayments	12,804	12,479
VAT	9,981	9,339
Pension scheme	3,112	-
	27,879	36,524

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11 Creditors: amounts falling due within one year

	2010	2009
	£	£
Trade creditors	29,382	56,927
Accruals	35,800	11,617
Deferred income	9,400	4,035
	<u>74,582</u>	<u>72,579</u>

Analysis of deferred income

	2010	2009
	£	£
Balance at 1 April	4,035	845
Transfer to miscellaneous income	-	(79)
Transfer to statement of financial activities	-	(766)
Transfer from statement of financial activities	5,365	4,035
Balance at 31 March	<u>9,400</u>	<u>4,035</u>

12 Government grants reserve

	Digistar	Buildings and grounds	Equipment	Exhibits	Total
	£	£	£	£	£
Balance at 1 April 2009	191,520	673,614	149,969	67,006	1,082,109
Additions	-	-	21,604	-	21,604
Disposals	-	-	-	-	-
Amortised	(37,067)	(120,253)	(25,390)	(26,854)	(209,564)
Balance at 31 March 2010	<u>154,453</u>	<u>553,361</u>	<u>146,183</u>	<u>40,152</u>	<u>894,149</u>

13 Unrestricted funds

	2010
	£
Balance at 1 April	(448,219)
Incoming resources	678,692
Resources expended	(660,581)
Other finance income	(35,000)
Adjustment to the statement of recognised gains and losses	(655,000)
Balance at 31 March	<u>(1,120,108)</u>

The unrestricted funds reserve includes a deficit of £1,136,000 (2009: £454,000) in respect of pension scheme liabilities of the pension fund.

Unrestricted funds after reversal of the pension adjustments are as follows:

	£
Unrestricted funds at 31 March 2010	
Balance on unrestricted funds at 31 March 2010	(1,120,108)
Reversal of pension scheme debtor	(3,112)
Reversal of pension scheme liability	1,136,000
Unrestricted funds at 31 March 2010 after reversal of pension adjustments	<u>12,780</u>

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14 Restricted funds

	Balance 1/4/2009	Incoming resources	Resources expended	Transfer between funds	Transfer from defrd. income	Transfer to defrd. income	Balance 31/3/2010
	£	£	£	£	£	£	£
DCAL grants							
Capital	-	21,604	(21,604)	-	-	-	-
Total DCAL grants	-	21,604	(21,604)	-	-	-	-
Other grants and receipts							
Discover Primary Science	-	2,200	(1,099)	-	-	(1,101)	-
Ultach Trust and Ard Mhacha grants	-	15,700	(11,436)	-	-	(4,264)	-
STFC	-	6,000	(6,000)	-	-	-	-
Total other grants and receipts	-	23,900	(18,535)	-	-	(5,365)	-
	-	45,504	(40,139)	-	-	(5,365)	-

DCAL grants

DCAL provided funding of £21,604 for the purchase of equipment.

Discovery Primary Science

The Planetarium participates in the Discover Primary Science project, funded and managed by Forfás on behalf of the Office of Science and Technology in Ireland. The purpose of the project is to develop an interest in science for primary school children in Ireland.

Ultach and Naiscoil Ard Mhacha grants

The Planetarium received a total of £15,700 from Ultach and Naiscoil Ard Mhacha to produce and promote the Irish language version of Planetarium shows.

STFC

The STFC Large Award Science in the Community scheme provided £6,000 for the creation and development of assets for the initial ISIS environment under the ELVIS STFC Large Award.

15 Designated funds

	2010 £	2009 £
Revaluation of land and buildings		
Balance at 1 April	4,636,081	4,636,081
Revaluation	-	-
Balance at 31 March	4,636,081	4,636,081

The corporation's land and buildings were revalued at 31 March 2007 by Land & Property Services (formerly the Valuation & Lands Agency), an Agency within the Department of Finance and Personnel on the following bases:

Land and buildings

Operational land and buildings which are unique due their specialised nature and design
Operational non-specialised land and buildings
Other land and buildings

Basis

depreciated replacement cost
existing use value
market value

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16 Analysis of net assets between funds

	Designated funds £	Unrestricted funds £	Restricted funds £	Total funds £
Tangible fixed assets	5,530,230	-	-	5,530,230
Current assets	-	90,474	-	90,474
Creditors: amounts falling due within one year	-	(74,582)	-	(74,582)
Pension	-	(1,136,000)	-	(1,136,000)
Net current liabilities	-	(1,120,108)	-	(1,120,108)
Creditors: amounts falling due after more than one year	-	-	-	-
Net assets/(liabilities)	5,530,230	(1,120,108)	-	4,410,122

17 Analysis of net cash funds

	1 April 2009 £	Cashflow £	Non cash movement £	31 March 2010 £
Cash at bank and in hand	30,292	21,086	-	51,378
Net funds	30,292	21,086	-	51,378

18 Reconciliation of net cashflow to movement in net cash funds

	2010 £	2009 £
Increase/(decrease) in cash in financial year	21,086	(36,574)
Net funds at 1 April	30,292	66,866
Net funds at 31 March	51,378	30,292

19 Pension scheme

An actuarial valuation of the NILGOSC scheme was carried out at 31 March 2007. The funding level (ratio of assets to past service liabilities) at 31 March 2007 was 89% compared to 85% at 31 March 2004 corresponding to a funding deficit of £396 million, which will have to be recovered by increasing employers' contribution rates. The employers' contribution rate for 2009/2010 of 16% will increase to 17% in 2010/2011 and it is anticipated that there will be further increases in subsequent years.

The NILGOSC actuary, Hymans Robertson LLP, has provided the following details for the purposes of accounting for the Planetarium's share of the scheme deficit in accordance with FRS 17.

Financial assumptions used by the actuary were:

	31/3/2010	31/3/2009	31/3/2008
Rate of increase in salaries	5.3%	4.6%	5.1%
Inflation/pension increase	3.8%	3.1%	3.6%
Discount rate	5.5%	6.9%	6.9%
Expected return on assets	7.2%	6.5%	7.3%

Mortality assumptions

	2010 Years	2009 Years
Longevity at age 65 for current pensioners:		
- Men	20.8	19.6
- Women	24.1	22.5
Longevity at age 65 for future pensioners:		
- Men	22.3	20.7
- Women	25.7	23.6

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The fair value of assets in the scheme and expected rates of return

	Long term rate of return 31/3/2010 %	Value at 31/3/2010 £k	Long term rate of return 31/3/2009 %	Value at 31/3/2009 £k	Long term rate of return 31/3/2008 %	Value at 31/3/2008 £k
Equities	7.8%	1,207	7.0%	801	7.7%	1,135
Bonds	5.0%	219	5.4%	154	5.7%	166
Property	5.8%	94	4.9%	77	5.7%	117
Cash	4.8%	47	4.0%	66	4.8%	22
		1,567	7.3%	1,098	7.2%	1,440

Asset values at 31 March 2009 are at bid values as required under FRS 17.

Scheme balance sheet

	31/3/2010 £k	31/3/2009 £k	31/3/2008 £k
Fair value of assets	1,567	1,098	1,440
Present value of scheme liabilities:			
Present value of unfunded scheme liabilities	(5)	(5)	(5)
Present value of funded liabilities	(2,698)	(1,547)	(1,610)
Total value of scheme liabilities	(2,703)	(1,552)	(1,615)
Deficit in the scheme	(1,136)	(454)	(175)

Analysis of amount charged to operating profit in respect of the scheme

	Year to 31/3/2010 £k	Year to 31/3/2009 £k	Year to 31/3/2008 £k
Current service cost	22	43	36
Past service cost	10	-	-
	32	43	36

Analysis of amount charged to other finance expenses

	Year to 31/3/2010 £k	Year to 31/3/2009 £k	Year to 31/3/2008 £k
Expected return on scheme assets	72	105	104
Interest on scheme liabilities	(107)	(111)	(97)
Net return	(35)	(6)	7

Recognition in the statement of financial activities

	Year to 31/3/2010 £k	Year to 31/3/2010 %	Year to 31/3/2009 £k	Year to 31/3/2009 %
Current service costs	22	9.6%	43	11.3%
Past service cost	10	4.3%	-	-
Interest costs	107	46.5%	111	29.2%
Expected return on assets	(72)	(31.3%)	(105)	(27.6%)
Total	67	29.1%	49	12.9%
Actual return on assets	459		(333)	

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Reconciliation of defined benefit obligation

	Year to 31/3/2010	Year to 31/3/2009
	£k	£k
Opening defined benefit obligation	1,552	1,615
Current service cost	22	43
Past service costs/(gains)	10	-
Interest cost	107	111
Contributions by members	11	23
Actuarial losses/(gains)	1,042	(170)
Estimated unfunded benefits paid	(1)	(1)
Benefits paid	(40)	(69)
Closing defined benefit obligation	2,703	1,552

Reconciliation of fair value of assets

	Year to 31/3/2010	Year to 31/3/2009
	£k	£k
Opening fair value of assets	1,098	1,440
Expected return on assets	72	105
Contributions by members	11	23
Contributions by the corporation	39	41
Contributions in respect of unfunded benefits	1	1
Actuarial gains/(losses)	387	(442)
Unfunded benefits paid	(1)	(1)
Benefits paid	(40)	(69)
Closing fair value of assets	1,567	1,098

Amount for current and previous accounting years

	Year to 31/3/2010	Year to 31/3/2009	Year to 31/3/2008	Year to 31/3/2007	Year to 31/3/2006
	£k	£k	£k	£k	£k
Fair value of assets	1,567	1,098	1,440	1,452	1,361
Present value of defined benefit obligation	(2,703)	(1,552)	(1,615)	(1,785)	(1,432)
Surplus/(deficit)	(1,136)	(454)	(175)	(333)	(71)
Experience gains/(losses) on assets	387	(442)	(131)	(17)	204
Experience gains/(losses) on liabilities	-	-	(57)	(1)	4

Amount recognised in the statement of recognised gains and losses (SRGL)

	Year to 31/3/2010	Year to 31/3/2009	Year to 31/3/2008	Year to 31/3/2007	Year to 31/3/2006
	£k	£k	£k	£k	£k
Actuarial gains/(losses)	(655)	(272)	150	(272)	13
Increase/(decrease) in irrecoverable surplus from membership fall and other factors	-	-	-	-	-
Actuarial gains/(losses) recognised in the SRGL	(655)	(272)	150	(272)	13
Cumulative actuarial gains/(losses)	(1,002)	(347)	(75)	(225)	47

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20 Commitments

There were no capital commitments at the 31 March 2010 (2009: £nil).

21 Related-Party Transactions

None of the members of the Board of Governors, the Management Committee, the Director or other related parties have undertaken any material transactions with the Armagh Planetarium during the year. The Armagh Planetarium has had various material transactions with a number of Government Departments, Executive Agencies and Non-Departmental Public Bodies in Northern Ireland and the UK. Most of these transactions have been with the Department of Culture, Arts and Leisure (DCAL), the Southern Education and Library Board (SELB) and the Central Procurement Directorate (CPD). The DCAL provide recurrent and capital grant (page 53, note 2) and the SELB and the CPD are the Centres of Procurement Expertize for the corporation.

22 Shop and mail order trading account

	2010 £	2009 £
Sales	77,661	58,765
Less: cost of sales		
Opening stock	11,544	9,278
Add: Purchases	44,189	42,834
	55,733	52,112
Less: closing stock	(11,217)	(11,544)
	44,516	40,568
Gross profit	33,145	18,197
Gross profit %	42.7	31.0

Note: Other costs relating to the Shop and Mail Order operations are included with other Planetarium costs under resources expended.

23 Financial Instruments

As the cash requirements of the Planetarium are met through grants from the Department of Culture, Arts and Leisure and other grant funding bodies, financial instruments play a more limited role in creating risk than would apply to a non-public sector body of a similar size. The majority of financial instruments relate to contracts to buy non-financial items in line with the Planetarium's expected purchase and usage requirements and the Planetarium is therefore exposed to little credit, liquidity or market risk.

24 Contingent Liability

There is an unresolved issue concerning whether the agreement on Equal Pay reached by the Northern Ireland Civil Service (NICS) Management and the Trade Union Side in December 2009 applies to Armagh Planetarium staff on the same pay scales as those NICS staff covered by the agreement. The agreement comprises an increase in pay scales from 1 February 2009 and a settlement payment depending on service in the period from 1 February 2003 to 31 January 2009.

The Armagh Planetarium is bound to follow NICS pay scales and accordingly the cost of implementing the new pay scales of £6,400 back to February 2009 has been included in the accounts as an accrual pending the receipt of permission from the DCAL to proceed with the implementation of the revised pay scales. The potential liability for the payment of the settlement, estimated at £25,000 at 31 March 2010 has been treated as a contingent liability pending further clarification of the issue.

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25 Additional disclosures to comply with the Financial Reporting Manual (FReM)

FReM requires non-departmental public bodies to regard grant-in-aid received as contributions from controlling bodies giving rise to a financial interest in the residual interest of the body and hence accounting for as financing, that is by crediting then to income and expenditure reserve. In addition the FReM requires grant-in-aid to be accounted for on a cash basis.

However, as the corporation is required to prepare accounts in accordance with the SORP for charities, the DCAL has given the corporation permission to continue to treat grants as income. If the Planetarium were required to comply with the FReM the result of this compliance would be as follows:

Statement of Financial Activities prepared under FReM

	2010	2009
	£	£
Incoming resources		
Incoming resources from other non-DCAL grants	18,535	3,955
Admissions	143,953	130,239
Outreach	11,630	11,839
Shop and mail order gross profit	33,145	18,197
Other incoming resources	6,964	13,979
Total incoming resources	214,227	178,209
Resources expended		
Direct expenditure of the corporation	495,991	458,134
Fundraising and publicity	22,671	44,868
Management and administration of the corporation	160,454	158,771
Capital expenditure	21,604	67,741
Notional cost of capital	169,402	191,636
Total Resources expended	870,122	921,150
Net deficit for the year	(655,895)	(742,941)
Credit in respect of notional cost of capital	169,402	191,636
Finance (costs)/income - pension scheme	(35,000)	(6,000)
Actuarial loss - pension scheme	(655,000)	(272,000)
Amount transferred to funds	(1,176,493)	(829,305)

Analysis of funds prepared under the FReM

	2010	2009
	£	£
Balance at 1 April	5,269,971	5,680,659
Adjustment to opening funds	-	766
Movement in government grant reserve	(187,960)	(131,124)
Movement in designated funds	-	-
Grant-in-aid received in the year	504,604	548,975
Net operating costs for the year	(1,176,493)	(829,305)
Balance at 31 March	4,410,122	5,269,971



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