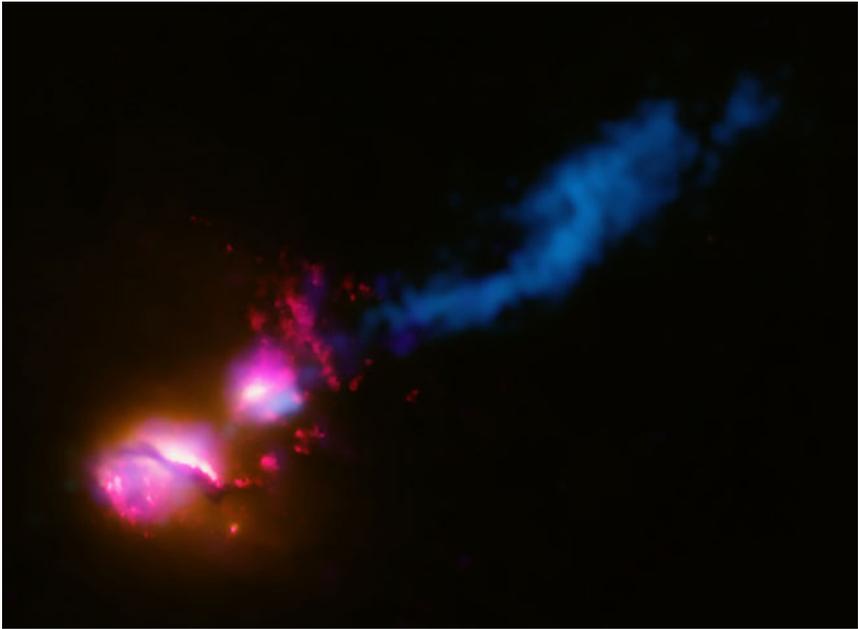


# Cosmic Bullying

Image Credit: X-ray: NASA/CXC/CAVD, Evans et al.; Optical/UV: NASA/STScI; Radio: NSF/VLA/CAVD, Evans et al.; STFC/JBO/MERLIN



**Fatal Beauty** This composite image (about 180 000 light years across) shows the jet from the black hole at the centre of one galaxy striking another galaxy, the first time such an interaction has been found. In the image, data from several wavelengths have been combined. X-rays from Chandra (coloured purple), optical and ultraviolet data from the HST (red and orange), and radio emission from the VLA and MERLIN (blue) show how the jet from the main galaxy on the lower left is striking its companion galaxy to the right.

By Wendy McCorry, Science Communicator

It is sad but these days we hear a lot in the news about bullying of various types – physical, mental and the latest, of course, cyber-bullying. Cases of bullying usually take place between schoolchildren, work colleagues or even family members, but did you know that bullying also occurs in the cosmos? No, not between feuding astronauts, but between galaxies! Last month, the first ever observed case of inter-galactic bullying was reported by NASA scientists.

The ‘bully’, nicknamed the ‘Death Star Galaxy’,

was observed blasting a smaller neighbouring galaxy with a powerful jet of deadly radiation particles from its centre. Travelling close to the speed of light, the jet slammed into the lower section of the smaller galaxy, before dramatically twisting as it was deflected away. Neil Tyson, director of the Hayden Planetarium in New York dramatically comments, “It is like a black hole bully, punching the nose of a passing galaxy.”

Compared to the vast age of the Universe this event is relatively recent, having occurred around one million years ago. It is estimated that it may continue for another ten to one hundred million

years. Using the Chandra X-ray observatory, the Hubble and Spitzer Space Telescopes and the Very Large Array and the UK's Merlin (both are ground-based radio telescopes), astronomers have been able to build up a picture of the dramatic event, which occurred in a distant system called 3C321 - 1.4 billion light years (0.43 gigaparsecs) away from Earth. The two galaxies involved are in orbit around one another, and will eventually merge into one larger galaxy. Whilst merging galaxies are a common enough occurrence, such a violent outburst between two galaxies has never before been observed by astronomers.

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Most galaxies are believed to have supermassive black holes at their centre, and a small number of galaxies emit powerful jets from these black holes. How this occurs is still not fully understood. Such galaxies are called radio galaxies, as the jets are easily visible at radio wavelengths. Astronomers believe that the smaller of the two galaxies was unfortunate enough to enter the path of such a jet, emanating from the centre of

its larger neighbour.

The proximity of the two galaxies (around twenty thousand light years, about the same distance Earth is from the centre of the Milky Way) means that any planetary systems in the path of the deadly jet are likely to have been destroyed. It is thought that as many as tens of millions of stars, some of which may have had orbiting planets, were hit by the deadly emission. Should the Earth have been one of these planets, the effects would have been devastating. Over a matter of months, the jet would have stripped away the ozone layer, and compressed the protective magnetosphere, leaving the planet exposed to the harmful effects of both the Sun's rays and the jet itself. It is unlikely that any life forms on the surface would have been able to survive.

Surprisingly, there may just be a happy ending to this particular episode of cosmic bullying. After all the death and destruction, Dr Martin Hardcastle, researcher at the University of Hertfordshire, believes that the effect of the jet smashing into the other galaxy could have a positive outcome. The emission may actually cause the galactic clouds of gas and dust within the smaller galaxy to contract, thus igniting star birth and resulting in the creation of a whole new generation of stars.