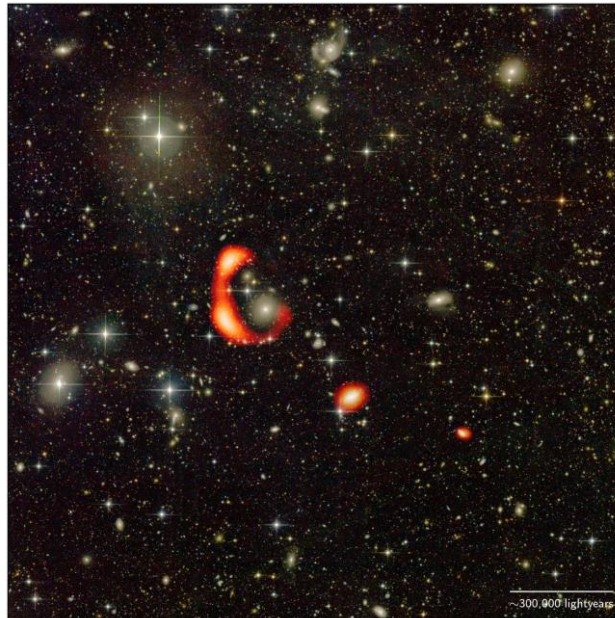


## Starless gigantic hydrogen gas ring found around a distant galaxy

Millions of years ago, when dinosaurs were roaming on Earth, about 260 million light-years away from Earth, a collision happened between two galaxies. This collision resulted in the expulsion of hydrogen gas which formed a ring and the scheduled star formation failed to occur.

The event remained unrecorded for long. A team of scientists from the National Centre for Radio Astrophysics (NCRA), Pune, and Indian Institute of Astrophysics, an autonomous institute of the Department of Science and Technology, discovered a mysterious ring of neutral hydrogen gas around a galaxy named AGC 203001 at about the same distance. The hydrogen ring was found with the help of the Giant Metrewave Radio Telescope (GMRT) and Canada-France-Hawaii-Telescope (CHFT) in Mauna Kea, Hawaii. However, strangely they found no stars that had formed from it.

The strange finding was published in the Monthly Notices of the Royal Astronomical Society and led by Omkar Bait, a Ph.D. student from National Centre Radio Astrophysics (NCRA) along with Sushma Kurapati and Yogesh Wadadekar from NCRA, Pierre-Alain Duc, University of Strasbourg in France, Jean-Charles Cuillandre of PSL University in France, Peter Kamphuis, Ruhr University, Germany and Sudhanshu Barway from Indian Institute of Astrophysics, Bengaluru.



Galaxies have anywhere from a million to a trillion stars, which are held together by gravity and also contain dust, gas, dark matter and giant star-forming rings. These rings around the galaxies are created by the collision of a smaller galaxy onto a big galaxy producing a burst of star formation which gives a spectacular appearance to the galaxy.

The scientists have detected radio emissions at a wavelength of 21 cm due to neutral hydrogen gas of AGC 203001 galaxy originating from the giant hydrogen ring. The ring is much bigger than the galaxy it surrounds and has a diameter about 4 times that of our Milky Way and only the second of its kind ever detected.

The researchers pointed out that Hydrogen rings are usually accompanied with a ring of stars. However, detection of such a galaxy with a giant hydrogen ring is rare, more so because there were no stars within it from the deep optical image of galaxy AGC 203001.

They added that the origin and formation of such rings is still a matter of deliberation among astrophysicists. The emission from neutral hydrogen atoms has allowed scientists to map the

amount and distribution of neutral hydrogen gas in galaxies. Such large reservoirs of neutral hydrogen gas are found in galaxies, which are actively forming new stars. However, despite showing no signs of active star formation, the early galaxy AGC 203001 was known to have a large amount of Hydrogen gas as shown by GMRT observations is baffling.

Due to collision between galaxies, the gas was expelled from the disk of AGC 203001 galaxy which formed a ring; however, stars were not formed in the ring. ” said Sudhanshu Barway from Indian Institute of Astrophysics, Bengaluru, one of the scientists who were part of the study.