

## **Brightest message of star collapse from space: Indian scientists participate in a study**

Gamma Ray Bursts (GRB), known to be one of the most energetic flashes of light in the universe caused by the collapse of massive stars or the merging of neutron stars in distant galaxies, is one of the strongest signals in our cosmic quest.

A team of scientists from more than 20 countries, including two scientists from Aryabhata Research Institute of Observational Sciences (ARIES), an Autonomous Institution of the Department of Science and Technology have spotted the highest energy photons from Gamma-ray bursts (GRBs).

This is the first GRB detected by the MAGIC telescopes (Major Atmospheric Gamma Imaging Cherenkov Telescopes) a system of two Imaging Atmospheric Cherenkov telescopes situated at Observatorio on Canary Islands, which detects particle showers released by gamma rays, using faint light radiated by the charged particles in the showers known as GRB 190114C.

This ground-breaking achievement by MAGIC provides critical new insight for understanding the physical processes at work in GRBs, which are still mysterious. The photons detected by MAGIC must have originated from a process hitherto unseen in the afterglows of GRBs, clearly distinct from the physical process that is known to be responsible for their emission at lower energies.



The GRB was discovered in January last year independently by two space satellites—the Neil Gehrels Swift Observatory and the Fermi Gamma-ray Space Telescope. The event was named GRB 190114C. Immediately, its coordinates in the sky were distributed as an electronic alert to astronomers worldwide, including the MAGIC Collaboration.

The scientists, including Dr. Kuntal Misra and Dr. S. B. Pandey, detected the very first-time Teraelectronvolts (TeV) photons from a GRB. It was announced by the MAGIC Collaboration to the international community of astronomers just a few hours after the satellite alerts. After a careful check of the preliminary data, it was later found that this GRB is located in a galaxy from which it took 4.5 billion years for the light to reach the Earth. The results were published in the journal Nature.

Gamma-ray bursts (GRBs) are brief and extremely powerful cosmic explosions, suddenly appearing in the sky, about once per day. They are thought to result from the. They commence with an initial, very bright flash, called the prompt emission, with a duration ranging from a fraction of a second to hundreds of seconds. The prompt emission is accompanied by the so-

called afterglow, a less bright but longer lasting emission over a broad range of wavelengths that fades with time.

Earlier in 2018 as well, Dr. S. B. Pandey from ARIES worked with a team of scientists analyzed multi-band data of another very interesting event called GRB 160625B published in 'Nature Astronomy,' highlighting underlying physics behind these energetic cosmic explosions.

Additionally, the 3.6m Devasthal Optical Telescope of ARIES at Nainital is also ready to study such events in the near future and it could contribute significantly towards the study of such time-critical cosmic explosions.