

A bright and narrow line at mega-electronvolt photon energies in the prompt emission of GRB 221009A

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Gamma-ray bursts (GRBs) are the brightest, yet among the most obscure, explosions in the Universe. Their temporal and spectral properties keep eluding our attempts at understanding them in a systematic way, and surprising events with unprecedented features are observed every year. A recent example is GRB 221009A, the “brightest of all times” (BOAT). The occurrence rate of such an event, based on the extrapolation of the known population, should be less than one in ten thousand years, yet it has been observed in only 50 years of GRB astronomy. Among the riddles posed by the BOAT, one of the most intriguing is the presence of a bright, narrow emission line in its prompt emission spectra. The line shows up in spectra that follow the peak of the emission, and it has a central photon energy of around 10 MeV. A time-resolved analysis shows evidence of a decrease in both the luminosity and the central energy with time. In this talk, I will discuss the observational properties of this feature and its possible physical interpretation.

Primary author: Dr SALAFIA, Om Sharan (Istituto Nazionale di Astrofisica (INAF))

Co-authors: GHIRLANDA, Giancarlo (Istituto Nazionale di Astrofisica (INAF)); OGANESYAN, Gor (Gran Sasso Science Institute); Dr RAVASIO, Maria Edvige (Radboud University)

Presenter: Dr SALAFIA, Om Sharan (Istituto Nazionale di Astrofisica (INAF))

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