

GRB 180720B as a binary-driven hypernova of type I

Monday, 16 May 2022 11:45 (40 minutes)

A time-resolved analysis of GRB 180720B confirms its binary-driven hypernovae (BdHN) I nature. The accretion of supernova (SN) ejecta onto the neutron star (NS) companion leads to its gravitational collapse forming a black hole (BH). The accretion onto the newborn NS (ν NS) spins it up to a millisecond pulsar. By interpreting the data, we identify six episodes in addition to the X-ray, GeV, and sub-TeV afterglows. The BH formation is determined by the ultra-relativistic prompt emission (UPE) phase. After reviewing the nature of six different episodes in this GRB, we confirm a self-similar hierarchical structure of the UPE characterized by a cutoff power-law plus black body (CPL+BB) spectrum on decreasing time scales. This leads to identifying the multiple expanding $e^+ e^-$ pair electromagnetic plasma produced by the vacuum polarization quantum process in the inner engine, loaded with baryons, until the transparency point.

Primary authors: RUFFINI, R.; LI, Liang.; RUEDA, J. A.; SAHAKYAN, N.; MORADI, R.; WANG, Yu.

Presenter: MORADI, R.

Session Classification: Morning session