

Abstract Submitted
for the APR16 Meeting of
The American Physical Society

Choked Jets and Low-Luminosity Gamma-Ray Bursts as Hidden Neutrino Sources NICHOLAS SENNO, KOHTA MURASE, PETER MSZROS, Pennsylvania State Univ — I will discuss choked gamma-ray burst (GRB) jets as possible sources of very high-energy (VHE) cosmic neutrinos. The jet propagation physics and radiation constraints are taken into account. We find that efficient shock acceleration of cosmic rays inside a high density stellar environment is possible for sufficiently low-powered jets and/or jets buried in an extended optically thick envelope. Such conditions are favorable also for the GRB jets to become stalled. Such choked jets may explain transrelativistic SNe or low-luminosity GRBs by launching quasi-spherical shocks that breakout in the optically thick wind. Focusing on this possibility, we calculate the resulting diffuse neutrino spectra using the latest results of the local llGRB rate and luminosity function. We confirm that llGRBs can potentially give a significant contribution to the measured neutrino flux. The results are compatible with the IceCube (IC) data around 10-100 TeV without contradicting other IC limits on classical GRBs. Choked and llGRBs are dark in GeV-TeV gamma rays, and do not contribute significantly to the Fermi diffuse gamma-ray background. Precursor TeV neutrinos emerging prior to the shock breakout emission can be used as smoking gun evidence for a choked jet model for llGRBs.

Nicholas Senno
Pennsylvania State Univ

Date submitted: 04 Jan 2016

Electronic form version 1.4