Contribution ID: **49** Type: **Oral Contributions**

Dim Jets as Very High Energy Neutrino Sources

Tuesday 13 September 2016 17:10 (20 minutes)

The Antarctic neutrino observatory IceCube (IC) has detected a robust diffuse flux signal consistent with neutrinos of extragalactic origin. To date, none of the observed neutrinos have been associated with point sources or transient events. New analyses by the IC and *Fermi* collaborations have introduced tension between electromagnetic measurements and the gamma-ray signal theorized to accompany the astrophysical neutrinos. I will discuss choked jet gamma-ray bursts (GRBs) as possible neutrino sources. Such choked jets may explain transrelativistic SNe or low-luminosity GRBs by launching quasi-spherical shocks that breakout in an optically thick wind. The jet propagation physics and radiation constraints are taken into account. We find that the same conditions which cause a jet to stall also produce a favorable environment for the efficient shock acceleration of cosmic rays and the production of neutrinos via photohadronic ($p\gamma$) processes. Our results are compatible with the IC data around 10-100 TeV without contradicting the gamma-ray limits. Precursor TeV neutrinos emerging prior to the electromagnetic emission of such an explosion can be used as smoking gun evidence for a choked jet model for low-luminosity GRBs.

Summary

New evidence implies that the sources of the IceCube diffuse neutrino signal are gamma-ray dim. Choked jet gamma-ray bursts and jetted tidal disruption events are considered as potential neutrino sources.

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Session Classification: Neutrinos

Track Classification: Neutrinos