J55a High Energy Neutrinos from Choked Jets

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The leading model of gamma-ray bursts (GRBs) involves a relativistic jet, where the observed gamma rays are produced by synchrotron radiation from Fermi-accelerated electrons in optically thin shocks. In addition to electrons, protons are expected to be shock accelerated, making GRBs one of the leading sources of potential high energy neutrinos. It has been pointed out that particle acceleration in optically thick shocks, and in jets that stall inside the progenitor (i.e. choked jets), photon emission will be suppressed, so that neutrinos may be the only observable signature (Mészáros & Waxman 2001).

Recently, with the detection of low luminosity GRBs, the fraction of supernovae housing relativistic jets has been brought into reconsideration. It has been suggested that midly-relativistic jets are much more common than ultrarelativistic jets inferred from GRB rates (Soderberg et al. 2006). Moreover, the fraction of jets can in fact be even higher when choked jets are taken into account.

In this talk we present results of investigating high energy neutrinos from choked jets. Starting from a simple definition of a choked jet, we analytically follow the jet propagation through the progenitor. We point out the importance of the reverse shock in choked jets, and by a careful consideration of cooling processes whithin the jet, present the expected neutrino spectrum and event rates in IceCube class detectors.