

Photo-hadronic neutrino production in blazars: Cascading constraints and effects of anisotropies

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The identification of the gamma-ray bright BL Lac object TXS 0506+05 with very-high-energy neutrinos detected by IceCube triggered a large number of works on the physics implications of neutrino production in blazar jets. Most of these works agree that GeV - TeV gamma-rays are unlikely to be produced by the same hadronic processes generating the IceCube neutrinos in the same emission region. In previous work, we had developed a method to derive general constraints on the physical conditions in the neutrino emission region and multi-wavelength electromagnetic signatures expected to go in tandem with such neutrino production. Our main conclusion is that, in order to produce IceCube neutrinos at the level of the 2014-15 neutrino flare from the direction of TXS 0506+056, an intense UV - soft X-ray radiation field external to the jet is required as target photon field for photo-pion interactions. This result necessitates the proper treatment of anisotropies of the target photon field in the frame of the emission region. In this talk, we will briefly summarize previous work and present first results of our study of the effects of anisotropies on the resulting neutrino yield and electromagnetic signatures.

Authors: BOETTCHER, Markus (North-West University); REIMER, Anita (University of Innsbruck); BUSON, Sara; Dr ABDALLA, Hassan (North-West University)

Presenter: BOETTCHER, Markus (North-West University)

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