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PROBING BLAZAR PHYSICS WITH ASTROPHYSICAL NEUTRINOS

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Astrophysical neutrinos, the "ghost particles of the Cosmos", are unique probes of the physical conditions in their sources, as they can escape from them and reach Earth almost unimpeded due to their extremely weak interactions with matter and radiation. High-energy neutrinos, which are mainly produced by inelastic collisions of relativistic protons or heavier nuclei with radiation or matter, can be used to trace the elusive sources of cosmic rays and to shed light on the underlying particle acceleration mechanisms. The recent discovery of a high-energy neutrino coincident with an electromagnetic flare from a blazar (TXS 0506+056) offers a unique opportunity to probe the physics of these powerful extragalactic sources using multiple messengers (i.e., photons and neutrinos). In this talk, I will review the lessons learned and the challenges created from the first high-energy neutrino source association to date.

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