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Neutrinos from blazar PKS 1502+106

The source PKS 1502+106, a flat-spectrum radio quasar (FSRQ) located at redshift 1.84, is the fifteenth brightest known gamma-ray blazar. Theoretically, these sources are expected to be potential cosmic ray accelerators and efficient high-energy neutrino emitters. In July 2019, the IceCube experiment, located in the South Pole, detected a 300 TeV neutrino from a direction consistent with PKS 1502+106. While the source was not undergoing exceptional activity in gamma rays at the time of the detection, it was flaring in the radio band, and emitting a hard X-ray spectrum. In this work we simulate the multi-wavelength emission of PKS 1502+106 using a self-consistent numerical model. We provide a comprehensive analysis both on the neutrino-emitting phase and past observations, suggesting the gamma-ray signals may be synchrotron radiation co-produced along with the neutrinos by the same cosmic-ray protons.

Mini-abstract

Cosmic-ray interactions in blazar PKS 1502+106 may help explain recent IceCube neutrino observation.

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