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Correlated neutrino and photon emission during γ -ray flares from the blazar Mrk 421

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Blazars, being highly variable sources across the electromagnetic spectrum, may serve as promising targets for high-energy neutrino detection, especially during periods of flaring activity. Using as a testbed the nearby blazar Mrk 421, we present a detailed hadronic model of its emission during a 13-day flare in 2010 with unprecedented multi-wavelength and temporal coverage. We calculate the expected muon neutrino event rate observed by IceCube at energies >1 PeV, and compare it with that expected from a longer, yet non-flaring, period of emission. After applying the derived correlation between the >1 PeV neutrino and 0.1-300 GeV emission to the long-term Fermi/LAT light curve of Mrk 421, we calculate the expected number of muon neutrino events above 1 PeV within 5 years of full IceCube detector livetime and discuss the implications of the results.

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