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High energy neutrinos from active galactic nuclei

The first evidence of an astrophysical high-energy neutrino signal as recently reported by the IceCube experiment now starts to open a new window towards astronomy with elementary particles. The detected excess in the diffuse neutrino flux leaves the concrete sources unknown at this point, but provides the opportunity to start constraining possible emission scenarios. In this paper, we investigate if the signal can be generated by proton-proton interactions in active galactic nuclei (AGN). We show what conditions need to be present in the AGN sub-class FR-I and FR-II radio jets in order to have those sources explain the IceCube signal via proton-proton interactions.

While FR-II lobes have too low column depths, the derived condition is met by the knots in FR-I jets, which makes it possible to single them out as the possible sources for the IceCube signal and at the same time as promising acceleration sites for cosmic rays above the ankle.

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