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Constraining a common origin of the astrophysical neutrino flux and UHECRs MARCO MUZIO, GLENNYS FARRAR, New York Univ NYU, MICHAEL UNGER, Karlsruhe Institute of Technology (KIT) — A quantitative and natural explanation for the ultrahigh-energy cosmic ray spectrum and composition is obtained by considering photonuclear interactions surrounding their sources. In particular this process accounts for both the feature in the particle flux called the "ankle" and the origin of the extragalactic protons below this feature (Unger, Farrar & Anchordoqui 2015). However, such a model does not explain the astrophysical neutrino spectrum observed by IceCube (see Muzio, Unger & Farrar 2019). Here we extend the source model to account for interactions with gas surrounding the site of UHECR acceleration. We perform high-precision simultaneous fits to the UHECR spectrum and composition, and the IceCube astrophysical neutrino flux, for a much more exacting treatment than the qualitative studies in the literature to date. We further explore the possibility of a light component of CRs at the highest energies and study their multi-messenger signatures.

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