Contribution ID: **89** Type: **Talk**

Testing hadronic and photo-hadronic interactions as responsible for UHECR and neutrino fluxes from Starburst Galaxies

Thursday, 6 October 2022 14:00 (20 minutes)

We test the hypothesis that starburst galaxies are the sources of ultra-high energy cosmic rays and high-energy neutrinos. The computation of interactions of ultra-high energy cosmic rays in the starburst environment as well as in the propagation to the Earth is made using a modified version of the Monte Carlo code *SimProp*, where hadronic processes are implemented for the first time. Taking into account a star-formation-rate distribution of sources, the fluxes of ultra-high energy cosmic rays and high-energy neutrinos are computed and compared with observations, and the explored parameter space for the source characteristics is discussed. We find that, depending on the density of the gas in the source environment, spallation reactions could hide the outcome in neutrinos from photo-hadronic interactions in the source environment and in extra-galactic space. We confirm that source-propagation models constitute a promising way to improve the discrimination power of models considering only ultra-high energy cosmic rays, on the way to unveiling the source class responsible for ultra-high energy cosmic rays and high-energy neutrinos.

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