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Searches for Ultra-High-Energy Neutrinos with the Pierre Auger Observatory

The Surface Detector (SD) of the Pierre Auger Observatory is used to search for ultra-high-energy (UHE) neutrinos of all flavours, which have energies beyond 0.1 EeV. They induce extensive air showers (EASs) that are efficiently detected and well separated from those produced by UHE cosmic rays. Additionally, the SD's large aperture leads to a UHE neutrino sensitivity competitive to that of dedicated neutrino telescopes. No UHE neutrinos have been found to date, imposing strong limits on their flux, severely constraining a variety of production models. Furthermore, limits on the UHE neutrino flux from point sources in a large declination band (−80° to 60°) are obtained. The varying exposure for different EAS inclinations causes a temporarily enhanced neutrino sensitivity in certain directions in the sky, benefiting multi-messenger follow-up searches, which will be discussed together with the overall UHE neutrino search results.

Mini-abstract

Pierre Auger Collaboration searches for UHE neutrinos constrain their flux, production, and sources

Experiment/Collaboration

The Pierre Auger Collaboration

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