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Ultra-high-energy neutrino searches and gravitational wave follow-up with the Pierre Auger Observatory

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The Surface Detector (SD) of the Pierre Auger Observatory is used to search for ultra-high-energy (UHE) neutrinos with energies beyond 0.1 EeV of all flavours. They induce extensive air showers (EASs) that are efficiently detected and well distinguishable from those produced by UHE cosmic rays. This, along with the large aperture of the SD, 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 and thereby severely constraining a variety of production models. Stringent 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, moving across the sky, temporarily causes a strongly enhanced neutrino sensitivity in certain directions, benefiting multi-messenger follow-up searches of transient events. As an application, the efforts of gravitational wave event follow-up searches for UHE neutrinos will be discussed.

Collaboration name

Pierre Auger Collaboration

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