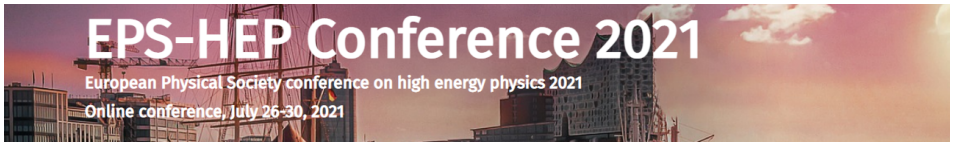


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# New constraints on supersymmetry using neutrino telescopes

*Monday, 26 July 2021 11:45 (15 minutes)*

We introduce a new approach to set limits on long-lived charged particles using neutrino telescopes and apply it to data. Towards the horizon, we expect a suppression of low-energy muons and electrons, due to the amount of material they must traverse, to reach the detector. Should the new long-lived charged particle possess a larger mass than the muon, then its energy loss will be suppressed compared to the latter. This results in them being able to reach underground neutrino detectors from the horizon, while appearing as minimally ionizing tracks. The only expected background are low-energy muons produced by neutrinos near the detector.
Using one year of public IceCube data this approach can set a lower mass bound of 320 GeV on the stau, which is predicted in some supersymmetric scenarios. Extending this methodology to ten years of data, we predict that IceCube can set a lower mass bound of 450 GeV, similar to current limits set by collider-based experiments. This opens the possibility of complimentary and competitive studies on new long-lived, charged particles using already existing and upcoming neutrino telescopes.

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