

Searching for heavy millicharged particles from the atmosphere

If millicharged particles (MCPs) exist they can be created in the atmosphere when high energy cosmic rays collide with nuclei and could subsequently be detected at neutrino experiments. We extend previous work, which considered MCPs from decays of light mesons and proton bremsstrahlung, by including production from Υ meson decays and the Drell-Yan process. MCPs with masses below a GeV primarily arise from proton bremsstrahlung, while heavier MCPs predominantly originate from heavy meson decays and Drell-Yan. We analyse the resulting single scatter and multiple scatter signals at SuperK and JUNO. Searches for low energy coincident signals at JUNO will be sensitive to MCPs with milli-charges up to an order of magnitude beyond current constraints for MCP masses between 2 GeV and 10 GeV.

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