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Charm hadroproduction in the atmosphere, QCD and neutrino astronomy

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We update predictions for lepton fluxes from the hadroproduction of charm quarks in the scattering of primary cosmic rays with the Earth's atmosphere. The calculation of charm-pair hadroproduction applies the latest results from perturbative QCD through next-to-next-to-leading order and modern parton distributions, together with estimates on various sources of uncertainties. Our predictions for the lepton fluxes turn out to be compatible, within the uncertainty band, with recent results in the literature. However, by taking into account contributions neglected in previous works, our total uncertainties are much larger. The predictions are crucial for the interpretation of results from neutrino experiments like IceCube, when disentangling signals of neutrinos of astrophysical origin from the atmospheric background.

Primary author: MOCH, Sven-Olaf (UHH)

Presenter: MOCH, Sven-Olaf (UHH)

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