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Neutrino Telescopes as QCD Microscopes

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We present state-of-the-art predictions for the ultra-high energy (UHE) neutrino-nucleus cross-sections in charged- and neutral-current scattering. The calculation is performed in the framework of collinear factorisation at NNLO, extended to include the resummation of small- x BFKL effects. Further improvements are made by accounting for the free-nucleon PDF constraints provided by D-meson data from LHCb and assessing the impact of nuclear corrections and heavy-quark mass effects. The calculations presented here should play an important role in the interpretation of future data from neutrino telescopes such as IceCube and KM3NET, and highlight the opportunities that astroparticle experiments offer to study the strong interactions.

Authors: Dr ROJO, Juan (VU Amsterdam and Nikhef); GAULD, Rhorry (ETH Zurich); BERTONE, Valerio (NIKHEF)

Presenter: Dr ROJO, Juan (VU Amsterdam and Nikhef)

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