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Seeing the high energy universe with cosmic neutrinos

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High energy cosmic neutrinos are generated by the interactions of cosmic rays with matter & radiation, so their spectrum extends up to ZeV energies. The detection of cosmic neutrinos up to multi-PeV energies by the IceCube Neutrino Observatory at the South Pole has thus provided a novel laboratory for fundamental interactions, complementary to collider experiments. The measured cross-section & inelasticity distribution of high energy neutrino interactions are consistent with pQCD, but at higher energies there may be signals of physics beyond the SM. Measurements of the flavour ratio also provide a sensitive probe of new physics that can affect neutrino oscillations over astronomical baselines.

Primary author: Prof. SARKAR, Subir (University of Oxford)

Presenter: Prof. SARKAR, Subir (University of Oxford)

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