Contribution ID: **89** Type: **dark matter**

A model independent probe for dark sectors at neutrino experiments

Present and upcoming neutrino experiments can have considerable sensitivity to dark sectors that interact feebly with the Standard Model. We consider light dark sectors (DS) interacting with the SM through well-motivated irrelevant portals. We derive bounds on such scenarios using the decay of dark sector excitations inside the neutrino detector, placed downstream from the target. Our approach is model-independent and applies to a wide range of dark sector models. In this approach, the dark sector is characterised by two energy scales $\Lambda_{\rm UV}$ (mass scale of mediators generating the portals) and $\Lambda_{\rm IR}$ (mass gap of the dark sector). At intermediate energies, far away from these scales, the theory is approximately scale-invariant, and allows calculation of production rates independent of the threshold corrections. We look at various DS production processes such as meson decays, direct partonic production, and dark bremsstrahlung. Neutrino experiments are able to probe new regions of parameter space, inaccessible in high energy experiments, and are comparable to fixed-target/beam-dump experiments. Future neutrino experiments will probe new parts of parameter space on a fairly shorter time scale, as compared to other proposed experiments, and provide an efficient probe of dark sectors.

Authors: COSTA, Marco; VERMA, Sonali; MISHRA, Rashmish (Harvard University)

Presenter: VERMA, Sonali