Contribution ID: **205** Type: **Parallel session talk**

Dark matter as the origin of neutrino mass in the inverse seesaw mechanism

Wednesday, January 12, 2022 12:00 PM (20 minutes)

We propose that neutrino masses are "seeded" by a dark sector within the inverse seesaw mechanism. The simplest way to have a "dark sector" as origin for neutrino masses in such inverse seesaw mechanism is to postulate the existence of an extra dark fermion f, as well as a new complex dark scalar ξ. This way we have a new, "hidden", variant of the scotogenic scenario for radiative neutrino masses. We discuss both explicit and dynamical lepton number violation. In the case of dynamical breaking of lepton number, we need one extra complex scalar which further implies the existence of a massless majoron. In addition to invisible Higgs decays with majoron emission, we discuss in detail the pheneomenolgy of scalar dark matter ξ, as well as the novel features associated to charged lepton flavour violation, and neutrino physics.

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Session Classification: Beyond the Standard Model

Track Classification: Beyond the Standard Model