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Approaching the neutrino mass problem with a beam dump experiment.

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The origin of the neutrino mass is still an open problem in physics and many efforts are being made to solve it.
Among the possible solutions, the simplest ones involve an extension of the Standard Model, where new singlet fermions are added. The most famous of this mechanism is the Type I seesaw, but the new particles introduced are usually at a scale not accessible by current and future experiments and therefore this model is not appealing for phenomenology studies.
However, symmetry-protected variants of the seesaw mechanism, like the Inverse Seesaw, could explain the existence of light-neutrino masses while also providing observable signatures of Heavy Neutral Leptons (HNLs) in a range of upcoming neutrino beam experiments.
In this talk, I will discuss the phenomenology of sterile neutrinos arising from low-scale neutrino mass models and the implications of a realistic mass model on the search for HNL. I will focus in particular on the impact on the signal of the strong polarisation effects in the beam for Majorana and (pseudo-)Dirac states, providing formulae to incorporate these in both production and decay. I will then talk about signatures for discovery of HNL and signatures of lepton number violation that could be searched for in beam dump experiment, taking the DUNE experiment as a case study.

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