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Deciphering the Mysteries of the Long-Lived Particles at the colliders

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Conventional searches at the LHC operate under the assumption that Beyond the Standard Model particles undergo immediate decay upon production. However, this assumption lacks inherent a priory justification. This talk delves into the exploration of displaced decay signatures across various collider experiments. Combining insights from several studies, we show how small Yukawa couplings, compressed mass spectra, and collider boosts lead to distinctive displaced decays, observable at the CMS, ATLAS and proposed future detectors. These phenomena, manifesting within both Type-I and Type-III seesaw mechanisms, and the Vector-like lepton model with non-zero hypercharge, provide a unique insight into the behaviors of neutrinos and dark matter. The seminar highlights the technical challenges and breakthroughs in detecting and interpreting these signatures, emphasizing their significance in probing the depths of the extensions of the Standard Model.

Track type

Collider and BSM Physics

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