

XXVII International Workshop on Deep Inelastic Scattering and Related Subjects



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A Heavy Metal Path to New Physics

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We show that heavy ion collisions at the LHC provide a promising environment to search for signatures with displaced vertices in well-motivated New Physics scenarios. The lower instantaneous luminosity in heavy ion collisions allows to operate the LHC experiments with very loose triggers. For scenarios in which long-lived particles are produced in the decay of light particles, this can increase the number of observable events by several orders of magnitude. If ions lighter than Pb are used, as it is currently discussed in the heavy ion community for unrelated reasons, this can lead to a higher sensitivity per time of running than in pp collisions. We illustrate that explicitly for heavy neutrinos in the Neutrino Minimal Standard Model. Another advantage of heavy ion collisions is the fact that there is no pile up, i.e., the average number of simultaneous interactions per bunch crossing is well below unity. This entirely removes the problem of mis-identifying the location of the primary vertex, which may be the key to trespass the systematics wall due to background uncertainties in the cases where background contamination mostly comes from SM particles that originate from different parts of the interaction region. This provides strong motivation to further explore the possibility to search for New Physics in heavy ion collisions.

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