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Particle Physics at LPTHE

Mardi 29 Octobre 2024, 14 :00
LPTHE, Library and Zoom (link in the comments)
Domaines : hep-ph

Titre : *Extreme astrophysical environments as a probe of heavy non-standard particles*

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Résumé : *Astrophysical systems, such as stars, have long been used as laboratories of non- standard species, including axion-like, millicharged, and majoron-like particles. For heavier species with MeV-scale masses, extremely hot environments, such as the cores of supernovae, provide the most competitive probes. Historically, studies of new particles in supernovae have focused on their effects on the non-standard cooling of the core. In this talk, I will critically review the status of these cooling bounds in light of a recent reanalysis of the SN 1987A neutrino observations. I will also introduce a set of novel observables recently proposed in supernovae, complementary to cooling rates, which provide stronger bounds on non-standard emission. These include the detection of decay products from non- standard particles and the energy they deposit in the supernova mantle. Building on this, I will also introduce neutron star mergers, particularly the multi- messenger observation of the GW 170817 event, as a modern and competitive probe for heavy non-standard particles.*