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Particle Physics at LPTHE

Mardi 11 Juillet 2023, 14 :00
LPTHE, library
Domaines : hep-ph

Titre : *Origin of a strong broadband 21 cm cosmological signal from dark matter spin-flip interactions*

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Résumé : *We explore a novel mechanism, where dark matter spin-flip interactions with electrons through a light axial-vector mediator could directly induce a 21 cm absorption signal which is characteristically different from the expected absorption features in the standard cosmology and in models with excess gas cooling, which have been broached to explain the recently observed anomalous signal in the EDGES experiment. We find generically that our model predicts a strong,broadband absorption signal extending from frequencies as low as 1.4 MHz (z 1000), from early in the cosmic dark ages where no conventional signal is expected, all the way up to higher frequencies where star formation and X-ray heating effects are expected to terminate the absorption signal. We find a rich set of spectral features that could be probed in current and future experiments looking for the global 21 cm signal. Large swathes of our model parameter space of interest are safe from existing particle physics constraints, however future searches for short range spin-dependent forces between electrons on the millimeter to nanometer scale have the potential to discover the light mediator responsible for our predicted signal.*