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Testing QED and Beyond with Exotic Atoms

Monday, 17 October 2022 14:30 (30 minutes)

Despite decades of effort, quantum electrodynamics (QED) is poorly tested in the regime of strong coulomb fields due to a confluence of difficulties linked to experimental limitations in highly-charged ion spectroscopy and nuclear uncertainties. I will present a new paradigm for probing higher-order QED effects using Rydberg states in exotic atoms, where orders of magnitude stronger field strengths can be achieved while nuclear uncertainties may be neglected [1]. Such tests are now possible due to the advent of quantum sensing detectors and new facilities providing low-energy intense beams of exotic particles for precision physics. I will present first results from experiments with muonic atoms at JPARC within the context of the HEATES collaboration, and discuss new ideas for synergies with muonic and antiprotonic atom spectroscopy in Europe.

[1] N. Paul et al, Physical Review Letters 126, 173001 (2021)

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