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**Quantum-enabled spectroscopy of trapped highly charged ions for tests of fundamental physics** ALESSANDRO L. BANDUCCI, SAMUEL M. BREWER, Colorado State University — The standard model (SM) of particle physics provides a description of nature that has been well-tested and confirmed at the high-energy scale. With the recent discovery of the Higgs boson, all known particles in the SM have been observed experimentally. However, despite the success of the SM several major problems remain unsolved. These include such phenomena as baryon asymmetry and the existence of dark matter. In the past few decades, high-precision atomic, molecular, and optical (AMO) experiments have offered a complementary approach to accelerators in the search for new physics. Due to enhanced relativistic effects, highly charged ions (HCIs) provide a unique platform for tests of fundamental physics including tests of quantum electrodynamics (QED) and searches for time-variation of the fundamental constants (e. g. $\dot{\alpha}/\alpha$). Here, we present the status of an experimental program aimed at performing high-precision, quantum-enabled laser spectroscopy of trapped HCIs to search for physics beyond the standard model.

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