Abstract

The extraordinary advances in quantum control of matter and light have been transformative for atomic and molecular precision measurements enabling probes of the most basic laws of Nature to gain a fundamental understanding of the physical Universe. Exceptional versatility, inventiveness, and rapid development of precision experiments supported by continuous technological advances and improved atomic and molecular theory led to rapid development of many avenues to explore new physics. I will give a broad overview of atomic physics searches for physics beyond the standard model (BSM) of elementary particles and focus on dark matter searches with atomic and nuclear clocks and new ideas for BSM searches with quantum sensors in space.

Biography

Marianna S. Safronova is a Professor of Physics at the University of Delaware. Safronova earned a Ph.D. in physics from the University of Notre Dame in 2021. Her diverse research interests include applications of quantum technologies to search for physics beyond the standard model of elementary particles and fields, development of atomic and nuclear clocks and their applications, ultra-cold atoms and quantum information, studies of fundamental symmetries, dark matter searches, quantum many-body theory and development of high-precision relativistic atomic codes, development of the online atomic data portal, highly-charged ions, superheavy atoms, and other topics. She is a Fellow of the American Physical Society and the 2018-2019 Chair of the American Physical Society Division of the Atomic, Molecular, and Optical Physics. She is a member of the Quantum Science and Technology Journal Editorial Board.