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(I) Progress towards atomic parity violation measurements in francium

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Low-energy precision tests of electro-weak physics keep playing an essential role in the search for new physics beyond the Standard Model. Atomic parity violation (APV) experiments measure the strength of highly forbidden atomic transitions induced by the exchange of Z bosons between electrons and quarks in heavy atoms. APV is sensitive to additional interactions such as leptoquarks, and provides complementary sensitivity to parity-violating electron scattering. Our group is working towards a measurement in francium, the heaviest alkali, where the APV signal is about 18 times larger than in cesium. Since Fr has no stable isotopes, we have established an online laser trap at the ISAC radioactive beam facility at TRIUMF that can confine millions of cold francium atoms at micro-Kelvin temperatures in a volume of approximately 1 cubic mm, an ideal environment for precision spectroscopy. Recently, we have observed the highly forbidden 7s-8s magnetic dipole transition, a final milestone prior to observing APV. I will review our recent work and present a roadmap for APV.
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