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Toward APNC measurements in Fr: recent progress and ongoing developments at TRIUMF

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The FrPNC collaboration is working toward a campaign of atomic parity non-conservation (APNC) measurements in francium to study the weak nuclear force. Weak interactions between atomic electrons and nucleons make it possible for electric dipole (E1) transitions to occur between atomic S states. As the heaviest alkali atom, Fr has a higher sensitivity to APNC because the effect scales with nuclear charge roughly as Z^3. We plan to measure the $E1_{\mathrm{pnc}}$ transition amplitude on the 7S→8S transition in Fr. These measurements will be carried out at the Francium Trapping Facility (FTF) located at TRIUMF. At the FTF, our group regularly uses AMO techniques to confine Fr and Rb atoms in a magneto-optical trap and investigates highly forbidden optical transitions in these atoms with precision laser spectroscopy. In this talk I will describe these techniques with a particular focus on the most recent experiment from January 2026 to measure the DC Stark shift of the 7S→8S transition in Fr and I will provide preliminary observations. I will also motivate and discuss the ongoing development of optical pumping to spin-polarize cold atom samples for APNC measurements.
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