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Efficient transfer of francium atoms[1] SETH AUBIN, College of William and Mary, JOHN BEHR, ALEXANDER GORELOV, MATT PEARSON, MICHAEL TANDECKI, TRIUMF, ROBERT COLLISTER, GERALD GWINNER, KYLE SHIELLS, University of Manitoba, EDUARDO GOMEZ, Autonomous University of San Luis Potosi, LUIS OROZCO, JIEHANG ZHANG, Joint Quantum Institute, YANTING ZHAO, Shanxi University, FRPNC COLLABORATION —
We report on the progress of the FrPNC collaboration towards Parity Non Conservation Measurements (PNC) using francium atoms at the TRIUMF accelerator. We demonstrate efficient transfer (higher than 40%) to the science vacuum chamber where the PNC measurements will be performed. The transfer uses a downward resonant push beam from the high-efficiency capture magneto optical trap (MOT) towards the science chamber where the atoms are recaptured in a second MOT. The transfer is very robust with respect to variations in the parameters (laser power, detuning, alignment, etc.). We accumulate a growing number of atoms at each transfer pulse (limited by the lifetime of the MOT) since the push beam does not eliminate the atoms already trapped in the science MOT. The number of atoms in the science MOT is on track to meet the requirements for competitive PNC measurements when high francium rates (previously demonstrated) are delivered to our apparatus. The catcher/neutralizer for the ion beam has been tested reliably to 100,000 heating/motion cycles. We present initial tests on the direct microwave excitation of the ground hyperfine transition at 45 GHz.

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