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Nuclear spin polarization and collinear laser spectroscopy program at TRIUMF

Monday, 20 October 2025 16:40 (20 minutes)

The polarizer facility at TRIUMF-ISAC is a versatile facility for delivering highly nuclear-spin-polarized radioactive isotope beams (RIB) to various experiments and conducting collinear fast-beam laser spectroscopy to investigate nuclear shapes and charge radii. In recent years, there has been growing interest in novel nuclear-spin-polarized beams which drives further research and development. A series of innovations have been implemented: upgrades of laser and beamline systems, developments of Rydberg-atom field-ionizer and fluorescence polarimeter, and improvements in photon detection of fluorescence. Meanwhile, we are pursuing a universal laser-nuclear-polarization method through spin exchange optical pumping (SEOP). Additionally to facilitate nuclear-spin polarization through direct optical pumping of exotic isotopes with unknown atomic structures, collinear fast-beam laser spectroscopy is conducted to precisely measure isotope shifts and hyperfine structures, which also offers valuable insights into the nuclear shapes and charge radii of these isotopes.

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Classification

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