

Internal Webinar

Precision spectroscopy of Rb D₂ line and fabrication and characterisation of Rb-Xe gas cell for atom-spin gyroscope

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This seminar will present my doctoral research in precision spectroscopy of the Rb D₂ line, where I proposed *ab initio* reduced rate equation models (with a maximum of 7 levels) that effectively capture hyperfine and Zeeman pumping, transit relaxation, and saturation effects in both Doppler-broadened and Doppler-free regimes. The models, validated experimentally without fitting parameters, accurately reproduce Doppler-broadened and Doppler-free spectra while requiring $\sim 100\times$ less memory than full multi-level models. It also includes a thorough experimental analysis of Polarisation Spectroscopy (PS) of the Rb D₂ line hyperfine features that yielded optimised error signals for robust laser frequency locking, achieving rms drifts of only a few hundred kHz, which is sufficient for resolving sub-MHz features such as electromagnetically induced transparency (EIT). For my proposed postdoctoral work at TIFR Hyderabad, I aim to apply my expertise in absorption spectroscopy, optical alignment, and polarisation measurements to optimise Rb-Xe vapour cell fabrication and characterise Rb density, relaxation, and light-induced magnetic effects. This will support systematic analysis of fabrication parameters and their influence on Rb-Xe spin coherence and atom-spin gyroscope performance.

Monday, Oct 19th 2026

10:30 Hrs

