

IV School on Light and Cold Atoms



October 20 – 31, 2025

ICTP-SAIFR, São Paulo, Brazil

Venue: ICTP-SAIFR/IFT-UNESP

Zoom ID: 843 3376 6175

Password: cold

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Additional Information

- **Morais, Iago Ferreira** (São Carlos Institute of Physics, Brazil): *Development of an Ion Trap for Quantum Computing and Precision Measurements: Stabilizing Lasers to Ultra-Stable References.*

Recent advances in quantum technologies highlight the central role of lasers in experiments with neutral atoms, trapped ions, and molecules, whether for cooling or for controlling quantum states. To achieve reproducibility and enable high-precision studies, these lasers must be frequency- and power-stabilized. For narrow atomic transitions relevant to quantum computing and quantum memories, ultra-stable frequency locking using high-finesse Fabry–Pérot cavities becomes indispensable. In this project, we aim to stabilize a laser to an ultra-stable high-finesse cavity that serves as a reference for locking an optical frequency comb. This setup transfers the stability of the main laser to multiple wavelengths, in particular 674 nm, crucial for implementing optical qubits in trapped Sr^+ ion experiments, enabling scalable quantum technologies and precision metrology. Key words: Ion Trap, Precision Metrology, Qubits, Frequency Locking and Optical Frequency Comb.