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Type: Oral Presentation

## Coupled Optical Resonance Laser Frequency Stabilization

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**Abstract content** **&nbsp;** (Max 300 words)**<br>**

We have demonstrated simultaneous laser frequency stabilization of a UV and IR laser, to coupled transitions of ions in the same spectroscopic sample, by monitoring only the absorption of the UV laser. Separate signals for locking the different lasers are obtained by modulating each laser at a different frequency and using lock-in detection of the single photodiode signal. Error signals can be generated for both lasers using phase modulation transfer. Experimentally, we simultaneously lock a 369nm and a 935nm laser to the  $S_{1/2} \rightarrow P_{1/2}$  and  $D_{3/2} \rightarrow D_{5/2}$  transitions respectively, of  $^{174}\text{Yb}^{+}$  ions generated in a hollow cathode discharge lamp. Stabilized lasers at these frequencies are required for cooling and trapping  $\text{Yb}^{+}$  ions in quantum information and precision metrology experiments. We use a rate equation model incorporating velocity changing collisions to explain the experimental results. This technique should be readily applicable to other ion and neutral atom systems.

**Apply to be considered for a student award (Yes / No)?**

Yes

**Level for award (Hons, MSc, PhD)?**

MSc

**Main supervisor (name and email) and his / her institution**

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**Would you like to submit a short paper for the Conference Proceedings (Yes / No)?**

No

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