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Analysis and Performance of a closed loop external cavity diode laser control system

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External cavity diode lasers (ECDL) are commonly used these days in laser cooling experiments involving Rubidium atoms. By adjusting the cavity length as well as the diode current the laser frequency can be finely tuned. The ECDL is locked to the appropriate Rubidium transition using a saturation absorption set together with a proportional-integral-derivative (PID) controller to control the cavity length and diode current. In this presentation we report on the analysis and performance of the closed loop control system using theoretical and numerically modelling, together with validation using experimental data.

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