

Phase noise in a 729 nm laser system

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High-fidelity gates in trapped Calcium ions rely heavily on the stability of the main 729 nm qubit-manipulation laser, often achieved through locking it to a high-finesse cavity. The quality of the feedback loop governing this lock directly influences the noise of the laser that goes to the ions. This work focuses on presenting and characterizing the performance of a high-bandwidth triple-cascaded feedback loop, used for locking a 729 nm Ti:Sapphire laser to a high-finesse cavity. The phase noise of the system is quantified with in-loop and beat-note measurements. In addition, the different noise sources in the loop are examined and their influence discussed.

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