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Measurement of the Damping Resistance of Laser Cooled 9Be^+ Ions using Image Current Detection

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At the proton g-factor experiment in Mainz we have recently succeeded in sympathetically cooling a single proton by laser-cooled 9Be^+ ions stored in a separate Penning trap. Here, the coupling between both ion species is mediated by image currents induced in a common RLC circuit. Uniquely, our setup combines laser cooling and fluorescence detection of the 9Be^+ ions with image current detection of the proton and the 9Be^+ ions. Using this setup, we were able to measure the laser-induced damping resistance using image currents. In this contribution, we present a map of the damping resistance as a function of laser frequency and laser power. Further, we relate the measured damping resistance to the measured fluorescence intensity and compare the results to theoretical predictions.

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