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Laser-induced charging of microfabricated ion traps GUANG HAO LOW, MIT, SHANNON X. WANG, sxwang@mit.edu, NATHAN LACHENMYER, YUFEI GE, PETER HERSKIND, ISAAC L. CHUANG, MIT — Microfabricated ion traps are promising candidates for realizing large-scale quantum computers, but small trap sizes leads to increased sensitivity of the trapped ions to surface effects, including localized charging of the trap electrodes. Laser-induced charging on microfabricated ion traps is studied by monitoring the ion micromotion over a period of up to 20 minutes that a laser is incident on the trap. The ion is trapped 100 μm above the metal surface and the trap is operated at 6K. The lasers used are at 405, 460, and 674 nm, which are relevant atomic transitions in Sr+ ions, and the typical intensity at the trap is 10^{35} photons/sec. The ion's micromotion signal is related to the number of charges created on the trap. A wavelength and material dependence of the charging behavior is observed: lasers at lower wavelengths cause more charging, and aluminum exhibits more charging than copper or gold. We describe the charging dynamic based on a rate equation approach.

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