Abstract Submitted
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Fiber optics in surface ion traps for scalable quantum information processing[1] YVES COLOMBE, AARON VANDEVENDER, National Institute of Standards and Technology, JASON AMINI, Georgia Tech Research Institute, DIETRICH LEIBFRIED, CHRISTIAN OSPELKAUS, JOHN BOLLINGER, DAVID WINELAND, National Institute of Standards and Technology — Fiber optics can provide a more scalable and resource efficient means of delivering light to and collecting fluorescence from a trapped ion than bulk optics. We demonstrate trapping of a $^{24}Mg^{+}$ ion in a gold-on-quartz surface-electrode Paul trap with an integrated high numerical-aperture multi-mode fiber located 50 μm below the electrode surface, and observe fluorescence photons through the fiber with a collection numerical aperture of 0.37. The trap features multiple RF electrodes whose potentials can be adjusted to vary the height of the pseudopotential zero from 30 to 50 μm above the electrode surface (80 to 100 μm from the fiber). This demonstrates the ability to trap and position ions near dielectrics, an important step toward trapping ions in fiber optic microcavities.

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