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POS-10 - Radio-frequency ion trap with an integrated optical cavity

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The miniaturization of optically addressable ion traps for the goal of scalable quantum information processing has led to an increased interest in finding a balance between ion and photon confinement.
We propose a radio-frequency ion trap integrated with an optical cavity in which the needle electrodes consist of a pair of tapered metal-coated optical fibers capped with semiconductor metasurfaces designed to act as high-reflectivity confocal mirrors. We present numerical simulations of the ion-trapping dynamics in this system and discuss the outlooks for achieving the strong-coupling regime for the ion-photon interaction inside the cavity formed by the two metasurface mirrors.

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