Laser-Generated Waves and Wakes in Rotating Ion Crystals

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Abstract

Locally excited plasma waves are generated in a Coulomb crystal by "pushing" with radiation pressure on a rotating cloud of laser-cooled ⁹Be⁺ ions. The waves form a stationary wake that is directly imaged through the dependence of the ion fluorescence on Doppler shifts, and theoretical calculations in a slab geometry are shown to accurately reproduce these images. The technique demonstrates a new method of exciting and studying waves in cold ion clouds.