Recoilless optical absorption and Doppler sidebands of a single trapped ion

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Spectroscopic measurements of the electric-quadrupole-allowed $5d^{10}6s\ ^2S_{1/2}$ to $5d^96s^2\ ^2D_{5/2}$ transition near 282 nm on a single, laser-cooled Hg^+ ion give a recoil-free absorption line (carrier) and well-resolved motional sidebands. From the intensity ratio of the sidebands to the carrier, the effective temperature of the Hg^+ ion was determined to be near the theoretical minimum of 1.7 mK. A fractional resolution of better than 3×10^{-11} for this ultraviolet transition is achieved.