



Ravi Krishnamurthy

(Raman Research Institute, Bangalore, India)

Collisional cooling of ions by cold atoms in a combined trap

Mixed systems of cooled and trapped, ions and atoms, have recently gained interest in studies of low energy collisions, cold chemistry and novel many body effects. We present the observation of collisional cooling of Rubidium ions trapped in a linear Paul trap by a spatially overlapping dilute gas of cold parent Rubidium atoms in a Magneto-Optical Trap (MOT). The cooling mechanism is explained theoretically and substantiated with numerical simulations emphasizing the role of resonant charge exchange interactions in the cooling process.

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Albert-Einstein-Allee 45 (Uni West), 89081 Ulm

