Abstract Submitted
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Travelling wave deceleration of heavy polar molecules in weak-field seeking states RICHARD HENDRICKS, NICHOLAS BULLEID, SARAH SKOFF, DANIEL SEGAL, BEN SAUER, MICHAEL TARBUTT, EDWARD HINDS, Imperial College, London, SAMUEL MEEK, ANDREAS OSTERWALDER, MAXWELL PARSONS, GABRIELE SANTAMBROGIO, GERARD MEIJER, Fritz-Haber-Institut der Max-Planck-Gesellschaft — Electrostatic forces can be used to decelerate neutral molecules via the Stark interaction. Most Stark decelerators to date use switched dc electric fields to manipulate light molecules in weak field seeking states. More massive molecules have smaller rotational constants and greater kinetic energies at a given velocity, and would require very long decelerators to bring them to rest. We have combined a new cryogenic source of YbF molecules, based on a pulsed solenoid valve cooled to 4K, with a 48cm long travelling wave Stark decelerator that is suitable for decelerating heavy molecules in weak-field seeking states. This decelerator uses continuously modulated sinusoidal electric fields to produce a series of moving 3-dimensional traps that can be continuously slowed to decelerate the molecules within them. We have decelerated YbF molecules from 300m/s to 276m/s. This implies that a 3 metre long decelerator could produce trapped YbF molecules at rest. In a different configuration, our source produces broader pulses of YbF molecules with speeds of 200m/s or less that could be brought to rest with a decelerator that is just 1 metre in length.

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