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Travelling-Wave Deceleration of Buffer-Gas Beams of CH MAYA FABRIKANT, NOAH FITCH, NICHOLAS FARROW, JILA, TIAN LI, JONATHAN WEINSTEIN, University of Nevada, Reno, HEATHER LEWANDOWSKI, JILA — Buffer-gas beams are a promising method for the production of bright sources of cold molecules. We have created ground state CH radicals in a buffer-gas cell to produce a cold molecular beam of 10^{11} mol./pulse. However, slowing and trapping molecules created in these sources presents challenges because of large pulse lengths and velocity spreads compared to more familiar supersonic beams. Traveling-wave decelerators are uniquely suited to meet these challenges because of their ability to confine molecules in three dimensions during deceleration and their versatility afforded by analog control of the last electrodes. We present a protocol for Stark deceleration of beams with a large velocity spread for use with a travelling-wave decelerator. Our method involves confining molecules transversely with a hexapole for an optimized distance before deceleration which precisely rotates the phase-space distribution of the molecules so that the portion of the packet that enters the decelerator always matches the phase-space acceptance. We demonstrate with simulations that using this method, we can effectively decelerate a significant portion of the molecules in many successive wells which may then be combined and trapped.

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