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A slow source of molecules for high resolution spectroscopy MARINA QUINTERO-PÉREZ, PAUL JANSEN, THOMAS E. WALL, WIM UBACHS, HENDRICK L. BETHLEM, LaserLaB, Dept. of Physics and Astronomy, VU University Amsterdam, ATOMIC LASER PHYSICS TEAM — We present experiments on decelerating and trapping ammonia molecules using a combination of a Stark decelerator and a traveling wave decelerator. In the traveling wave decelerator a moving potential is created by a series of ring-shaped electrodes to which oscillating high voltages are applied. By lowering the frequency of the applied voltages, the molecules confined in the moving trap are decelerated and brought to a standstill. As the molecules are confined in a true 3D well, this new kind of deceleration has practically no losses, resulting in a great improvement on the usual Stark deceleration techniques. The necessary voltages are generated by amplifying the output of an arbitrary wave generator using fast HV-amplifiers, giving us great control over the trapped molecules. We illustrate this by experiments in which we adiabatically cool trapped NH3 and ND3 molecules and resonantly excite their motion. Our main motivation for this research is the possibility to use the traveling wave decelerator as a source of cold molecules for a molecular fountain. Previous attempts to create a fountain using a Stark decelerator were unsuccessful due to losses at low velocities and a complex lens-system for cooling and collimating the slow beam. A traveling wave decelerator should solve both of these issues.

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