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Collisional cooling and trapping of molecules KEVIN E. STRECKER, Sandia National Labs, DAVID W. CHANDLER — Using a crossed molecular beam apparatus, we have shown that under the correct criteria, collisions between supersonic atoms and molecules can yield post-collision molecules at rest in the laboratory frame. This technique was first demonstrated in nitric oxide (NO), and has since been extended to other non- radical diatomics, strong polar molecules, and weak polar molecules. The cooling technique only relies on the momentum of the molecule or atom to be cooled and mass of the collision partner. However, it suffers from the fact that the cold molecules are produced at the crossing of two intense supersonic beams, which leads to glancing and secondary collisions which in turn heat the cold molecules. We have modified the apparatus so that the secondary collisions and heating of the cold molecules is minimized. Our observation time of the cold molecules is limited by the latent velocity distribution of the molecules, which is approximately 50mK. Under these conditions, we are currently attempting to implement a trap in the collision region to confine the cold molecules.

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