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A cryogenic buffer gas cooled beam of BaH for molecular laser cooling and ultracold fragmentation GEOFFREY IWATA, MARCO G. TARALLO, Columbia University, FABIAN SOERENSEN, Darmstadt Technical University, TANYA ZELEVINSKY, Columbia University — Laser cooled and trapped molecules promise many possibilities to explore a variety of fields such as many-body physics, quantum collisions and dissociation, and precision measurement. We report on an experiment for cooling and trapping barium monohydride (BaH) diatomic molecules. We present a cryogenic buffer gas cooling apparatus for producing a 4 K beam of BaH, and describe the laser cooling schemes necessary to load a molecular magneto-optical trap from that beam. Current progress includes identification of the cooling transitions in the BaH $B^2\Sigma \leftarrow X^2\Sigma$ manifold in laser ablated molecules and construction of the molecular beam. The large mass ratio of constituent atoms in BaH makes this system attractive for future studies of ultracold fragmentation, potentially resulting in samples of ultracold hydrogen atoms.

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