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**A general cold atomic and molecular beam source** STEPHEN MAXWELL, NATHANIEL BRAHMS, ROBERT DECARVALHO, DAVID PATTERSON, JOHN DOYLE, Department of Physics, Harvard University, DAVID GLENN, JESSIE PATRICKA, DAVID DEMILLE, Department of Physics, Yale University — We have demonstrated and characterized a high-flux beam source for cold, slow atoms or molecules. The desired species is vaporized using laser ablation, then cooled by thermalization in a cryogenic cell filled with $\sim$ 1 mTorr ($\sim 2 \times 10^{15}$ cm$^{-3}$) of helium buffer gas. The beam is formed by particles exiting a 3 mm hole in the buffer gas cell. We have characterized the properties of the beam (flux, forward velocity, translational and internal temperatures) for both an atom (Na) and a molecule (PbO) under varying buffer gas density at a cell temperature of $\sim$ 4 K. We have constructed a magnetic guide to separate the beam from the helium buffer gas and show that the source could be used to load a variety of traps with a wide range of atoms and molecules. We also plan to reduce the cell temperature below 1 K with additional cryogenic refrigeration.

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