Abstract Submitted
for the DAMOP13 Meeting of
The American Physical Society

Towards Magnetic Trapping of Polar Molecules from a Slow Buffer Gas Beam HSIN-I LU, IVAN KOZYRYEV, BOERGE HEMMERLING, JULIA PISKORSKI, JOHN DOYLE, Harvard University — General methods for delivering cold, chemically diverse molecules in large quantities could have a profound impact in the areas of quantum simulation, cold controlled chemistry, and particle physics using resonance methods. We report our progress towards loading of a very slow molecular beam into a deep magnetic trap via optical pumping. Employing a two-stage buffer gas cell configuration, we have produced a cold and slow CaF beam with a forward velocity of $v_f \sim 65$ m/s and a velocity spread of $\delta v_l \sim 40$ m/s. A hexapole magnetic lens is used to focus the molecular beam into a 4 T deep magnetic trap, located at 30 cm from the source. We plan to optically pump the molecules in two steps, achieving magnetic deceleration and irreversible trap loading. Since only a few photon scattering is required during the process, this method could be applicable to a wide range of magnetic molecules, including those lacking closed cycling transitions. Continuous loading to build up the molecular density as well as co-trapping of multiple species are feasible. Cold collisions and sympathetic cooling will be studied based on this work.

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Date submitted: 23 Jan 2013 Electronic form version 1.4