COOLING MOLECULES WITH LASER LIGHT

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Cooling certain molecules with laser light seems possible by techniques little different from those commonly used to cool certain atoms. As with atoms, the needed radiation pressure stems from the molecule's continual resonant scattering of light at rates of $>10^7$ photons/s, giving rise to deceleration rates exceeding 10^5g. Ten molecules have been identified to date that meet criteria for confinement within a so-called closed-loop cooling cycle[a]. Among them are the alkaline-earth monohydrides, the $A-X$ bands of which possess favorable properties for Doppler-cooling, including a (nearly) diagonal Franck-Condon array and good spectral isolation of the transitions that form the cooling cycle. We will show how a beam of such molecules can be laser cooled, and report the status of our experiments for the particular case of CaH.[b]

[a] M.D. Di Rosa, *Eur. Phys. J. D* **31**, 395 (2004).

[b] Funding from the Los Alamos National Laboratory LDRD Program is gratefully acknowledged.