Abstract Submitted
for the DAMOP09 Meeting of
The American Physical Society

Molecular cooling by optical pumping with shaped femtosecond pulses DANIEL COMPARAT, DIMITRIS SOFIKITIS, ANDRÉA FIORETTI, XIAOLIN LI, RIDHA HORCHANI, PIERRE PILLET, Laboratoire Aimé Cotton, CNRS, Université Paris-Sud, Bât.505, 91405 Orsay, France, MARIA ALLEGRINI, CNISM, Dipartimento di Fisica, Università di Pisa, Largo Pontecorvo, 3 56127 PISA, Italy, MARIN PICHLER, Physics Department, Goucher College, Baltimore, MD 21204, USA, SEBASTIEN WEBER, BÉATRICE CHATEL, Laboratoire Collisions, Agrégats, Réactivité (UMR 5589, CNRS - Université Paul Sabatier Toulouse 3), IRSAMC, Toulouse, France — Vibrational cooling of translationally cold Cs_2 molecules into a selected vibrational level v = 0,1,2 or v=7 of the singlet $X^1\Sigma_g^+$ ground electronic state has been realized. Our method is based on repeated optical pumping by laser light with a spectrum broad enough to excite all populated vibrational levels but frequency-shaped in such a way to eliminate transitions from the chosen v level, in which molecules accumulate. Using ultrashort pulse shaping techniques based on Liquid Crystal spatial light modulator a large fraction of the initial molecules is transfered into a single selected vibrational level such as v = 0,1, 2 and 7. Limitations of the method as well as the possible extension to rotational and translational cooling will also be discussed.

Marin Pichler
Physics Department, Goucher College, Baltimore, MD 21204, USA

Date submitted: 26 Jan 2009 Electronic form version 1.4