

Abstract Submitted
for the DAMOP08 Meeting of
The American Physical Society

Direct Coulomb explosion imaging of coherent rotational dynamics induced by few-cycle laser pulses in light and heavy hydrogen IRINA BOCHAROVA, MAIA MAGRAKVELIDZE, PREDRAG RANITOVIC, DIPANWITA RAY, LEWIS COCKE, IGOR LITVINYUK, Kansas State University — We followed fast evolution of angular distributions for H₂ and D₂ molecules after their interaction with 8 fs 800 nm laser pulses. The rotating molecules were exploded by another few-cycle probe pulse time-delayed for up to 10 ps in respect to the pump. For neutral molecules we observed coherent rotational dynamics characterized by periodic revivals without noticeable decoherence within the 10 ps time-scale. For D₂ up to 4 rotational states were involved in the wavepackets for each of the two spin isomers. In light hydrogen the resulting dynamics was dominated by beating of just two rotational states. The experimental data are in excellent agreement with our numerical simulations obtained by solving time-dependent Schrödinger equation. For molecules that were ionized by the pump pulse we observed both vibrational and rotational dynamics. Time-dependent angular distributions for the molecular ions exhibit transient alignment only soon after the pulse (20 fs for H₂⁺ and 40 fs for D₂⁺) with no consequent revivals within the next 10 ps.

Irina Bocharova
Kansas State University

Date submitted: 28 Jan 2008

Electronic form version 1.4