



Canadian Association
of Physicists

Association canadienne
des physiciens et physiciennes

Contribution ID: 233

Type: Oral (Non-Student) / Orale (non-étudiant(e))

Clocking enhanced ionization of hydrogen molecule using molecular rotational wavepackets

Thursday 10 June 2021 15:55 (4 minutes)

Laser-induced rotational wavepacket of hydrogen molecules has been experimentally observed in real time by using two sequential 25-fs laser pulses (pump-probe scheme) and a COLTRIMS spectrometer. By measuring the time-dependent yield of the above-threshold dissociation and the enhanced ionization of the molecule, we observed a few-femtosecond time delay in between the two dissociation pathways for both H₂ and D₂. The delay was understood and interpreted by a classical model considering enhanced ionization requires extra interaction with the laser field. We demonstrate the molecule rotational clock in hydrogen molecule is a straightforward method for timing ultrafast molecular dissociation dynamics.

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Session Classification: R3-2 Ultrafast Processes (DAMOPEC) / Procédés ultrarapides (DPAMPC)

Track Classification: Atomic, Molecular and Optical Physics, Canada / Physique atomique, moléculaire et photonique, Canada (DAMOPEC-DPAMPC)