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Clocking enhanced ionization of hydrogen molecule using molecular rotational wavepackets

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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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