Abstract Submitted
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Attosecond timing of asymmetric chemical bond breaking[1] M. MAGRAKVELIDZE, KSU, J. WU, Univ. Frankfurt (UF), L. PH. H. SCHMIDT, M. KUNITSKI, UF, T. PFEIFER, MPIK, M. SCHOEFFLER, M. PITZER, M. RICHTER, S. VOSS, H. SANN, H. KIM, T. JAHNKE, A. CZASCH, UF, U. THUMM, KSU, R. DOERNER, UF — Making use of a two-particle-coincidence technique which achieves attosecond time resolution in a long circularly polarized multicycle femtosecond laser pulse, we resolve at an attosecond time scale time the laserdriven ionization and fragmentation of H_2 by relating the instant of ionization of H_2 to the ejected electron direction and by subsequently breaking the H_2^+ bond in the same pulse. We find that the proton with which the bonding electron remains is determined by the ejection time of the first electron. This show that electron localization and asymmetrical breaking of molecular bonds is ubiquitous even in symmetric laser pulses. Our approach provides an ultrafast stopwatch using the jointly measured directions of two emitted particles as hands. This technique uses a single circularly polarized IR laser pulses and allows the measurement of time intervals based on momentum differences which can be detected with extremely high precision, even for long pulses, thereby providing a powerful tool for ultrafast science.

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