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Two-center interferences and nuclear wave packet imaging in dissociating H_2^+ molecule[1] ANTONIO PICON, ALON BAHABAD[2], HENRY C. KAPTEYN, MARGARET M. MURNANE, ANDREAS BECKER, JILA and Department of Physics, University of Colorado, 440 UCB, Boulder, CO 80309-0440 — Double-slit like interferences similar to those observed by Young in his experiment with light appear also in the photoionization of diatomic molecules. The partial electron waves ejected from the two atomic centers of the molecule take the role of the coherent light waves emerging from the two holes in Youngs experiment. We analyze theoretically and numerically a pump-probe scenario with two attosecond pulses in the hydrogen molecular ion. The first attosecond pulse induces the dissociation of the molecule, the second attosecond pulse is ionizing the molecule. By varying the delay between the pump and probe pulses we show how the two-center interferences allow to image main features of the nuclear wave packet, namely its velocity, internuclear distance, and spreading.

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