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Mapping and Controlling Ultrafast Dynamics of Highly Excited D2+ by Attosecond XUV Radiation PREDRAG RANITOVIC, ELI-ALPS, ELI-Hu Nkft, Dugonics ter 13, Szeged H6720, Hungary, C. HOGLE, L. MARTIN, JILA and Department of Physics, University of Colorado and NIST, Boulder, CO 80309, USA, R.Y. BELLO, A. PALACIOS, Departamento de Química, Módulo 13, Universidad Autónoma de Madrid, 28049 Madrid, Spain, J.L. SANZ-VICARIO, Grupo de Física Atómica y Molecular, Instituto de Física, Universidad de Antioquia, AA1226 Medellín, Colombia, F. MARTÍN, Departamento de Química, Módulo 13, Universidad Autónoma de Madrid, 28049 Madrid, Spain, XIAO-MIN TONG, Division of Materials Science, Faculty of Pure and Applied Science, University of Tsukuba, Ibaraki 305-8573, Japan, M. MURNANE, H. KAPTEYN, JILA and Department of Physics, University of Colorado and NIST, Boulder, CO 80309, USA
— We show how spectrally tailored attosecond extreme ultraviolet and femtosecond infrared radiation can be used to coherently populate, map and control dynamics of highly excited states of D_2^+ that rapidly dissociate. In particular, we used a 43 eV XUV and a weak IR beam to coherently populate highly excited electronic states of D2+ through one- and two-photon absorption processes. By using time-delayed probe laser pulses and 3D momentum imaging in a COLTRIMS geometry, we show how the dissociation can be mapped and controlled on attosecond time scales using Coulomb-explosion imaging. We found that the major excitation channel, dissociating to the n=2 limit, perpendicular to the XUV/IR radiation, is not the 2pPi_u, as discussed in literature, but the 2s Sigma_g.

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