

**Interference effects in the double ionization of hydrogen molecules by fast, highly charged ions**<sup>1</sup> NORA JOHNSON, Kansas State University, A. L. LANDERS, Auburn University, E. WELLS, Augustana College, T. OSIPOV, Kansas State University, K. D. CARNES, Kansas State University, A. S. ALNASER, Kansas State University, J. A. TANIS, Auburn University, J. H. MCGUIRE, Tulane University, I. BEN-ITZHAK, Kansas State University, C. L. Cocke, Kansas State University – Research was done at JRM Laboratory investigating the angular alignment dependence of hydrogen molecules with respect to 19 MeV  $F^{8+}$  projectiles. Cross sections of the angular alignment were determined using a COLTRIMS (cold target recoil ion momentum spectroscopy) apparatus in which the position and time of flight of two recoils and an electron were measured. 3D momentum imaging allows for reconstruction of the angle at the moment of impact and from the data it was determined that hydrogen preferentially double ionizes when it is aligned perpendicular to the projectile (~3.5:1). These results can be explained by interference effects, analogous to Young's double-slit experiment<sup>2</sup>.

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<sup>1</sup> A.L. Landers *et al.*, Phys. Rev. A **70**, 042702 (2004).

<sup>2</sup> R.P. Feynman, R.B. Leighton, and M. Sands, *The Feynman Lectures on Physics* (Addison-Wesley, Reading, MA, 1965), Vol. 3, pp. 1-11.

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