

Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

Dissociation Dynamics and Molecular Imaging of Methane following Photoionization at the Carbon K-Edge¹ J.B. WILLIAMS, A.L. LANDERS, Auburn University, C. TREVISAN, California Maritime Academy, T. JAHNKE, M.S. SCHOEFFLER, R. DOERNER, Frankfurt University, I. BOCHAROVA, F. STURM, C.W. MCCURDY, A. BELKACEM, TH. WEBER, Lawrence Berkeley National Laboratory — We have used Cold Target Recoil Ion Momentum Spectroscopy (COLTRIMS) to measure the momenta of the photoelectron and the molecular fragments arising from the dissociation of methane following core photoionization and subsequent Auger decay. We present results here that show (1) the full 3-D imaging of the molecule by the molecular frame photoelectron angular distribution; (2) the numerous dissociation pathways emerging from the unstable di- and tri-cations; (3) the dynamics associated with Jahn-Teller distortions in the breakdown of axial recoil behavior, where protons are only ejected along ground-state bond axes under certain conditions; and (4) the use of symmetries to improve statistics associated with measurements of this type. These results are compared with and interpreted through the use of Complex Kohn variational calculations.

¹supported in part by the US DOE Office of Basic Energy Sciences, Division of Chemical Sciences

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Date submitted: 27 Jan 2012

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