Abstract Submitted for the TSS08 Meeting of The American Physical Society

Role of symmetry in dissociation of highly symmetric molecules VANDANA SHARMA, aJILA, University of Colorado, Boulder, CO, 80303, USA, BHAS BAPAT, Physical Research Laboratory, Ahmedabad 380009, India, MAR-GARET MURNANE, HENRY KAPTEYN, JILA, University of Colorado, Boulder, CO, 80303, USA, PHYSICAL RESEARCH LABORATORY, AHMEDABAD 380009, INDIA TEAM, JILA, UNIVERSITY OF COLORADO, BOULDER, CO, 80303, USA TEAM — Highly charged molecular ions, formed by either photoabsorption or charged particle impact, undergo dissociation. Dissociation leads to a sharing of the total molecular charge and conversion of the internal energy into translational energy of the fragment. Molecular ions Molecular ion possesses a set of configurations with a certain symmetry. All these configurations have different electronic energy and depending on the energies the molecular ion follows different decay pathways. To obtain the properties of electronic states of the precursor ion and to understand the energetics of the break up, it is necessary to measure complete kinematic parameter of all ionic fragments. We investigate dissociation dynamics of the multiply charged molecular ions, or precursors, by multiple ion coincidence imaging of fragment ions. We have probed dynamics of the unimolecular fragmentation of tetrahedral (CCl_4) and octahedral (SF_6) molecules which are highly symmetric. The common thread between the two is that the parent ion $(SF_6^+ \text{ and } CCl_4^+)$ did not appear at all in the mass spectrum of the two. Hence, it can be concluded that these ions are unstable in its symmetrical configuration and exhibit Jahn–Teller instability [1].

> Vandana Sharma JILA, University of Colorado, Boulder, CO, 80303, USA

Date submitted: 19 Feb 2008

Electronic form version 1.4