

Abstract Submitted
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Ultrafast photoionization of toluene and the di- and trimethylbenzene isomers: the effects of orbital symmetry on intense-field stability¹ COLLIN MCACY, JOSHUA BECK, University of Nebraska-Lincoln, TIMOTHY SCARBOROUGH, California Institute of Technology, CORNELIS UITERWAAL, University of Nebraska-Lincoln — Our recently published work on the femtosecond intense-field photoionization of azabenzene and the diazabenzene isomers (J. Chem. Phys. 136, 054309 (2012)) presents the four molecules as a systematic series of perturbations to the ring structure of benzene. In these molecules, we have observed correlations between molecular orbital symmetry and stability against intense-field ionization and fragmentation. We further our exploration of this phenomenon with preliminary results on the ultrafast photoionization of seven similarly-structured substituted benzenes – toluene [$C_6H_5CH_3$], and the di- and trimethylbenzene isomers [$C_6H_4(CH_3)_2$ and $C_6H_3(CH_3)_3$] – divided into four molecular series related through various degrees of symmetry. Ions are created with 50 fs, 800 nm pulses under single-molecule conditions. Ion yields are collected with a time-of-flight ion mass spectrometer, and recorded as a function of laser intensity without the focal volume effect (Phys. Rev. Lett. 100, 023002 (2008)).

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