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Channel competition in strong-field dissociation of CS^{+1}
BETHANY JOCHIM, M. ZOHRABI, K.J. BETSCH, U. ABLIKIM, BEN BERRY, T. SEVERT, A.M. SUMMERS, K.D. CARNES, B.D. ESRY, I. BEN-ITZHAK, J. R. Macdonald Laboratory, Department of Physics, Kansas State University, Manhattan, KS USA 66506 — We study intense ultrafast laser-induced dissociation of a CS^+ ion beam, utilizing a coincidence 3-D momentum imaging technique. Over a laser intensity range of 10^{10}–10^{16} W/cm^2, we find clear intensity-dependent behavior of the C^++S and C+S^+ branching ratios. Specifically, we observe that the branching ratios are nearly equal at low intensities ($\sim 10^{10}$–10^{12} W/cm^2) and deviate from each other at higher intensities ($>10^{13}$ W/cm^2), where C+S^+ dominates. We propose that the low-intensity branching ratio behavior is due to strong mixing of states corresponding to the relevant dissociation limits mediated by the non-adiabatic couplings, and we identify possible dissociation pathways involving these couplings. Another aspect of channel competition, closing and opening of the two dissociation channels as a function of total energy, is distinctly observed, and this behavior is characterized using the well-known Wigner law for near-threshold behavior [1,2].

[1] E. P. Wigner, Phys. Rev. **73**, 1002 (1948).
[2] H. R. Sadeghpour *et al.*, J. Phys. B **33**, R93 (2000).

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