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Evidence for quantum effects in laser driven photodissociation of methylamines ILANA BAR, MICHAEL EPSHTEIN, ALEXANDER PORTNOV, Ben-Gurion University of the Negev — Non-adiabatic dynamics at conical intersections (CI) extensively affects the photostability of biomolecules by efficiently photoinducing decay routes that dissipate harmful excess ultraviolet energy. Here the photodissociation of the model test molecules, methylamine (CH_3NH_2) and its partially deuterated isotopologue (CD_3NH_2), excited to different specific vibrational modes in the electronically excited state has been investigated by H(D) photofragments detection with two-color reduced-Doppler ion imaging [1]. The H products, resulting from N-H bond cleavage via two dissociation pathways, showed anomalous distributions for some of the vibronic states, as indicated by dynamic resonances in the product branching ratio and in the anisotropy parameters. This vibronic-specific control is attributed to distinctive dynamical interferences of the initially prepared wavepackets, affecting the passage efficiency through the S_1/S_0 CIs. It is suggested that the H product distributions are extremely sensitive to the positions and energies of the CIs in the two molecules, rather than to the unique initial nuclear motion that promotes the coupling between the two electronic states. These observations reveal uniquely detailed insights into the dynamics of state-specific control of internal conversion.

[1] M. Epshtein, A. Portnov, R. Kupfer, S. Rosenwaks, and I. Bar, J. Chem. Phys. **139**, 184201 (2013).

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