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Dissociative ionization dynamics of Na_2 by non-resonant multi-photon ionization NADEEPA JAYASUNDARA, JULIEN VION, LUTZ HWEL, Wesleyan Univ — We present the results from a series of experimental studies on dissociative ionization behavior of sodium molecules with the aid of a mild supersonic molecular beam and linear time of flight (TOF) mass spectrometer. We have studied the production of Na^+ and Na_2^+ via a non-resonant delayed pump-probe multiphoton ionization using 355 nm, 532 nm, and 1064 nm photons. Upon absorption of two 355 nm photons from the pump laser, sodium molecules are promoted into neutral states, which converge to the repulsive $1^2\Sigma_u^+$ potential of Na_2^+. These dissociative Rydberg states are analogs to the well-known sates in the hydrogen molecule but much less studied for alkalis. The TOF spectra reveal a significant enhancement in both Na^+ and Na_2^+ ion yield with the absorption of another photon from the probe laser even after long delays like tens of microseconds.

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