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Predissociation and Dissociative Ionization of Rydberg States of Xe_2 and the Photodissociation of Xe_2^{+1} STEPHEN PRATT, ALVIN SHUBERT, MARIA REDNIC, Argonne National Laboratory — The Rydberg states of Xe_2 in the region between $76,000 \text{ cm}^{-1}$ and $84,000 \text{ cm}^{-1}$ were studied by using a combination of two-photon excitation and velocity map ion imaging. The electronic states in this region are based on the $\text{Xe}(^1\text{S}_0) + \text{Xe } 6\text{p}$ and 5d dissociation limits, and the large number of states leads to numerous curve crossings and distorted potentials. These Rydberg states can decay by predissociation or fluorescence, or can be photoionized, dissociatively photoionized, or photodissociated by the absorption of a single additional photon. Furthermore, the molecular ion can be photodissociated as well. While numerous other techniques have been applied to this problem, velocity map ion imaging provides a high resolution approach to determine the operative processes. When combined with existing data obtained by other methods, the present experiments allow a more complete understanding of the assignment and behavior of these states.

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