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Electric-field-induced dissociation of heavy Rydberg ion-pair states[1] CARLOS REINHOLD, Oak Ridge National Laboratory, SHUHEI YOSHIDA, Vienna University of Technology, CHANGHAO WANG, BARRY DUNNING, Rice University — A classical trajectory Monte Carlo approach is used to simulate the dissociation of $H^{+\cdot\cdot}F^{-}$ and $K^{+\cdot\cdot}Cl^{-}$ heavy-Rydberg ion pairs induced by a ramped electric field. Such field-induced dissociation is used experimentally to detect ion-pair states and analyze their binding energies. The simulations include the effects of the strong short-range repulsive interaction associated with ion-pair scattering. Their predictions are in good agreement with experimental data for Stark wavepackets probed by a ramped field, demonstrating that many of the characteristics of field-induced dissociation can be well described using a purely classical model. The data also show that states with a given value of principal quantum number (i.e., binding energy) can dissociate over a broad range of applied fields, the exact field being governed by the initial orbital angular momentum and orientation of the state.

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