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Formation of Heavy Rydberg $K^+ - SF_6^-$ Ion-Pair States in K(np)-SF_6 Collisions[1] M. CANNON, Y. LIU, F.B. DUNNING, Rice University — At low n ($n \approx$10 – 15), electron transfer in collisions between K(np) Rydberg atoms and SF_6 can lead to formation of bound $K^+ - SF_6^-$ ion pairs that orbit at relatively large separations, frequently referred to as heavy-Rydberg ion-pair states because of their similarities to atomic Rydberg states. The production of such ion pairs is examined through measurements at different values of n and with different Rydberg atom velocities. The lifetimes of the ion pairs are measured by observing the time development of the SF_6^- signal, part of which results from dissociation of bound ion pairs through the transfer of internal energy from the SF_6^- ions into translational energy of the ion pair. The data point to bound ion-pair lifetimes of $\sim$1 – 2μs, which are many times larger than their orbital periods of $\sim$30 – 150ps. This work is being extended to other attaching molecules to further examine the properties of heavy Rydberg systems.

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