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**Formation of heavy Rydberg ion-pair states in collisions of K($n$p) Rydberg atoms with attaching targets**[1] M. CANNON, C. WANG, F.B. DUNNING, Rice University — The formation of heavy-Rydberg ion-pair states through electron transfer in collisions between K($n$p) Rydberg atoms and molecules that attach low-energy electrons is investigated. The measurements show that low-$n$ collisions with a wide variety of target species ($SF_6$, c-$C_7F_{14}$, $C_6F_6$, and $CCl_4$) can lead to formation of bound ion-pair states and that, under appropriate conditions, a small fraction of these can subsequently dissociate as free ions through conversion of internal energy in the negative ion into translational energy of the product ion pairs. The lifetimes of those ion pairs that do dissociate are typically $\sim$ 1-5 $\mu$s. The data are analyzed using a semi-classical Monte Carlo collision model which shows that many of the bound ion pairs pass relatively close to one another facilitating energy conversion (and charge transfer). Work is in hand to detect ion-pair states directly through electric-field-induced dissociation and examine their properties in more detail.

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