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Close-encounter collisions between few keV H_2^+ and Ar: Can the H_2^+ survive?[1] NORA G. JOHNSON, A.M. SAYLER, BEN BERRY, WANIA WOLFF, B. GAIRE, M. ZOHRABI, J. MCKENNA, K.D. CARNES, I. BENITZHAK, J.R. Macdonald Laboratory, Department of Physics, Kansas State University — Collisions between 3 keV H_2^+ and Ar atoms lead predominantly to dissociative capture (DC) and collision-induced dissociation (CID). The large momentum transfer in close encounters between the nuclei of these collision partners can result in dissociation driven by vibrational excitation. One interesting question is, *can the* H_2^+ *molecule remain bound after absorbing the large momentum transfer typical to a trajectory that passes through the atom's electronic shells*? Our recent experimental evidence suggests that this may be the case and gives indications for what specific conditions make it possible. Explicitly, this insight is gained by studying the non-dissociating direct ionization process, $H_2^+ + Ar \rightarrow H_2^+ + Ar^+ + e^-$, and the complimentary collision induced dissociation process, $H_2^+ + Ar \rightarrow H^+ + H + Ar$, for the same momentum transfer.

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