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Possibility of vibrationally resolved cross section measurements for low energy charge transfer in H + $\mathbf{H_2^{+}}$[1] C.I. GUILLEN, R.A. STROM, J.A. TOBAR, D.I. PANCHENKO, V.M. ANDRIANARIJAONA, Department of Physics, Pacific Union College, Angwin, CA 94508 — Charge transfer (CT) in H + $H_2^+ \rightarrow H^+ + H_2$ has fundamental implications because it involves the smallest atomic ion, atom, molecular ion, and molecule possible. The current merged-beam apparatus at Oak Ridge National Laboratory (ORNL) in Oak Ridge, Tennessee, can reliably create and access low collision energies; the existing ion-atom merged beams apparatus there is the only apparatus currently able to benchmark the CT of these fundamental systems at energies below 0.1eV/u (Phys. Rev. A **84**, 062716, 2011). However, the data analysis suffers from the lack of information on the initial states of H_2^+ which makes comparison to state-to-state calculations (PRA **67** 022708 (2003) impossible without educated guesses. We are exploring the possibility of inserting a three-dimensional imaging technique at the end station of the ORNL apparatus in order to measure the vibrational state distribution of H_2^+ that are produced by the electron cyclotron resonance ion source. Our initial design for the insertion of this technique in the aforementioned system will be presented here.

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