

Abstract Submitted
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Proposed Development of a Novel Approach for Studying Anion-Neutral Reactions¹ D.W. SAVIN, W. MITTHUMSIRI, M. SCHNELL, B. SEREDYUK, Columbia University, C.C. HAVENER, M.E. BANNISTER, Oak Ridge National Laboratory, A. DORN, Max-Planck-Institute for Nuclear Physics — We propose a new method for studying anion-neutral reactions. We will use fast, merged anion-neutral beams and detect the charged end products. This novel approach will utilize the ion-atom merged-beams apparatus, a unique state-of-the-art facility located at Oak Ridge National Laboratory, and expand its capabilities by adding a detection system to collect detached product electrons. Future extensions will allow us to detect product anions. Laboratory beam energies will be in the keV range; but because the beams run co-linear, center-of-mass energies from the meV to keV range can be achieved. Proof-of-principle measurements will be carried out using the associative detachment process $H^- + H \rightarrow H_2^- \rightarrow H_2 + e^-$. Published values for this reaction range over a factor of 5. The situation is little better for the time-reverse dissociative attachment process $H_2 + e^- \rightarrow H_2^- \rightarrow H^- + H$. Our proposed research will help to resolve this issue. Future possible research directions include adding a cold molecular anion source in order to study reactions such as $X + YZ^-$. This will allow investigations into a wide range of anion-neutral reactions.

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D.W. Savin
Columbia University

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