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Charge exchange measurements with neutral hydrogen using the X-ray Quantum Calorimeter (XQC)

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X-ray emission from charge exchange between highly-charged ions and neutral atoms forms a significant portion of the emissions from galactic outflows and stellar winds and is an important source of soft X-ray emission in our Solar system. Theoretical modeling of the velocity-dependent partial cross sections for X-ray line emission in charge exchange has so far proven difficult. High-resolution laboratory measurements of X-ray line emissions from charge exchange over a wide range of collision velocities are needed to test and benchmark the various theoretical models currently available.

Our XQC sounding rocket detector system has been modified for efficient use as a detector on the merged beam facility at Oak Ridge National Labs (ORNL). We are using this to take high-resolution spectra of charge exchange between astrophysically relevant ions and neutral H atoms. Any ion of interest can be generated and merged with a neutral H beam with relative velocities adjustable over the entire range of astrophysical interest. We present our initial results and details of the experimental design.

Less than 5 years of experience since completion of Ph.D

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Student (Ph.D., M.Sc. or B.Sc.)

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