**High-Resolution Laboratory Measurements Advancing Diagnostics of Astrophysical and Fusion Plasmas**

Chintan Shah1,2,

*1 NASA Goddard Space Flight Center, Greenbelt, MD, USA*

*2 Max-Planck-Institut für Kernphysik, Heidelberg, Germany*

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The latest generation of high-resolution UV and X-ray spectroscopic instruments available onboard current and future satellite observatories present exciting opportunities to investigate processes occurring in astrophysical plasmas, particularly those found in galaxy clusters and near active galactic nuclei. However, the insights that can be gained from analyzing the observed spectra are currently limited by the availability and quality of atomic data, which are crucial for developing plasma diagnostic models. This limitation is particularly acute for highly charged ions (HCI) that are ubiquitous in hot astrophysical environments as well as magnetically confined fusion plasmas. Laboratory measurements are essential for providing atomic data, such as transition energies, and excitation and ionization rates. We use electron beam ion traps and synchrotron light sources to resonantly excite electronic transitions in trapped HCI. This enables us to gather and benchmark spectroscopic data with unprecedented accuracy, leading to new insights into astrophysical plasma diagnostics.