High-energy Electron-ion and Photon-ion Collisions: Status and Challenges

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Non-LTE plasmas are ubiquitous in objects studied in the UV and X-ray energy bands.
Collisional and photoionization cross sections for atoms and ions are fundamental to our ability to model such plasmas. Modeling is key in the X-ray band, where detector properties and limited spectral resolution limit the ability to measure model-independent line strengths, or other spectral features. Much of the motivation for studying such collisions and many of the tools, are not new. However, the motivation for such studies and their applications, have been affected by the advent of X-ray spectroscopy with the gratings on $Chandra$ and $XMM-Newton$. In this talk I will review this motivation and describe the tools currently in use for such studies. I will also describe some current unresolved problems and the likely future needs for such data.