

Development of Plasma Codes for High-Resolution X-Ray Spectroscopy and Prospects for Future Observations of Non-Equilibrium Plasma

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Since the Soft X-ray Spectrometer (SXS) aboard ASTRO-H is non-dispersive spectrometer with high energy resolution, it will enable us to perform fine spectroscopy for extended sources, such as clusters of galaxies and supernova remnants (SNRs). X-ray spectra of these objects are usually dominated by emission from optically-thin thermal plasma. Therefore, plasma models optimized for high-resolution spectroscopy are essential to interpret an observed thermal X-ray spectrum. We present a current status of our development of spectral codes based on the latest atomic database for astrophysics (a.k.a. AtomDB). Motivated by recent results from *Suzaku* and other missions, we are developing models of overionized plasma and charge exchange emission. Spectroscopic studies of these intriguing phenomena will be some of the most important tasks for ASTRO-H.

We also present our prospects for observations of SNRs with the SXS. In young SNRs expanding into a low-density interstellar medium, the shock-heated plasma is expected to be far from equilibrium in terms of electron and ion temperatures. Therefore, measurement of thermal Doppler broadening of emission lines is important to understand SNRs' energetics and evolution. Diagnostics using weak lines from low-abundance elements will provide key information about detailed nature of SNRs' progenitor and/or environment. However, searching for Cr or Mn emission, which has often been done with *Suzaku*, is NOT suitable for ASTRO-H, as we will explain quantitatively. (The presentation will be given in Japanese.)