Z207r XRISM Observations of Galactic Diffuse Sources in Performance Verification Phase

Hiroyuki Uchida (Kyoto University) & the XRISM team

X-ray spectra of galactic diffuse sources, such as supernova remnants (SNRs), are generally complex, consisting of both thermal emission in ionization equilibrium and non-equilibrium states, as well as non-thermal emission. Conventional CCD studies have revealed the plasma's composition, temperature and ionization state, including progenitor characteristics and shock physics in SNRs, by detecting emission lines from abundant elements like Si and Fe, specifically He-like and H-like ions. However, resolving the complex spectra, particularly line structures, requires higher energy resolution. While high-resolution spectroscopy with diffraction gratings has been partially employed, its application is limited due to the degradation of energy resolution caused by the spatial distribution. The X-Ray Imaging and Spectroscopy Mission (XRISM), launched on September 7, 2023, carries the microcalorimeter *Resolve* ($\Delta E/E \lesssim 5$ eV), enabling high-resolution X-ray spectroscopy of any diffuse object for the first time. Together with the wide-field imager *Xtend* ($38' \times 38'$), our understanding of galactic diffuse sources is expected to advance significantly. XRISM will not only allow for more *detailed measurements* of the temperature, ionization and kinematics of plasmas but also enable a *qualitative shift* in the study, including the detection of rare elements to constrain nucleosynthesis and satellite lines for plasma diagnostics, exploring atomic processes. In this presentation, I will overview the latest results from the Performance Verification (PV) phase observations of galactic diffuse sources, and will discuss future prospects.