16th International Workshop on Low Temperature Detectors
20 24 July 2015

Soft X-ray Spectrometer, SXS, onboard ASTRO-H - status and performance

Main author:

MITSUDA Kazuhisa

Co-authors:

Kelley Richard, L., NASA/GoddardSpace Flight Center

Mitsuda Kazuhisa, Institute of Space and Astronautical Science, JAXA

SXS team The, various institutions from Japan, the US, the Netherlands, and Switzerland

The Soft X-ray spectrometer (SXS) is a high-energy-resolution X-ray spectrometer onboard ASTRO-H which will be the sixth in a series of Japan's X-ray observatory. The SXS is being developed by international collaboration lead by JAXA and NASA with European participations. It utilizes an X-ray micorcalorimeter array operated at 50 mK and expected to provide the highest energy resolution as ever obtained in orbit in the energy band of 1-12 keV. Together with the focusing X-ray telescope, the largest effective area will be achieved in the energy band of 0.3-12 keV among in-orbit high-resolution spectrometers with a resolving power of E/DE> 100. Furthermore differently from the high-resolution spectrometers onboard Chandra and XMM-Newton observatories already in orbit, the energy resolution does not degrade even for spatially extended X-ray sources. Therefore, the SXS will provide us with brand new knowledge of various types of high-energy objects. The SXS will be, in particular, strong tool for the study of the evolution of the large scale structure of universe.

The SXS system consists of the cryostat in which the detector system is cooled by a four-stage cooling chain, the analog/digital calorimeter signal processors, cooling system drive electronics, the filter wheel calibration system, and other related electronics. The SXS fight system was delivered to the spacecraft in late March 2015. Extensive spacecraft level tests are now being carried out and will continue until around the end of 2015. Then ASTRO-H will be shipped to the launch site and put into orbit with an H2A launch vehicle.

In this paper we present the design, flight model status, the performance we verified in the ground test, and the science we expect to obtain as the outcome of the high energy resolution spectroscopy. In addition, we will also report the problems we encountered

during the development, and how we solved them. The most difficult problem was the interference from the micro vibrations of the mechanical coolers. We will describe how the micro vibrations affected the microcalorimeter performance and how we isolated them.