[구GC-22] Observation of the Cosmic Near-Infrared Background with the CIBER rocket

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The First stars (Pop.III stars) in the universe are expected to be formed between the recombination era at z ~ 1100 and the most distant quasar (z ~ 8). They have never been directly detected due to its faintness so far, but can be observed as a background radiation at around 1μm which is called the Cosmic Near-Infrared Background (CNB). Main part of the CNB is thought to be redshifted Lyman-alpha from gas clouds surrounding the Pop.III stars. Until now, the COBE (COsmic Background Explorer) and the IRTS (Infrared Telescope in Space) observed excess emission over the background due to galaxies.

To confirm the COBE and the IRTS results and pursue more observational evidences, we carried out the sounding rocket experiment named the Cosmic Infrared Background ExpeRiment (CIBER). The CIBER is successfully launched on July 10, 2010 at White Sands Missile Range, New Mexico, USA. It consists of three kinds of instruments. We report the results obtained by LRS (Low Resolution Spectrometer) which is developed to fill the uncovered spectrum around 1μm. LRS is a refractive telescope of 5.5 cm aperture with spectral resolution of 20 ~ 30 and wavelength coverage of 0.7 to 2.0μm. After subtracting foreground components (zodiacal light, integrated star light and diffuse galactic light) from the sky brightness of observed five fields, there remained significant residual emission (even for the lower limit case) consistent with the IRTS and the COBE results. In addition, there exists a clear gap at 0.7 ~ 0.8μm in the CNB spectrum over the background due to galaxies according to recent results (Matsuoka et al. 2011; Mattila et al. 2011). The origin of the excess emission could be ascribed to the Pop.III stars with its active era of z = 7 ~ 10.