[GC23] Chandra Multiwavelength Project X-ray Point Source Number Counts and the Cosmic X-ray Background

Minsun Kim

Department of Physics and Astronomy, Astronomy Program, Seoul National University

The purpose of this thesis is to investigate the nature of the cosmic X-ray background (CXRB) by estimating the fractional contribution of the X-ray point sources to the total CXRB. To accomplish this purpose, we (1) produce the Chandra Multiwavelength Project (ChaMP) X-ray point source catalog, (2) perform extensive simulations to investigate the sensitivity, completeness, and positional uncertainty of the ChaMP sample, (3) derive the cumulative and differential number counts of ChaMP and ChaMP+CDFs X-ray point sources, (4) investigate the cause of the break in the differential number counts, (5) estimate resolved CXRB flux densities by integrating the differential number counts of the ChaMP and ChaMP+CDFs, (6) estimate the total CXRB flux densities by adding the resolved CXRB flux density of the ChaMP and ChaMP+CDFs to the unresolved CXRB flux density given by Hickox & Markevitch [2006, ApJ, 645, 95], and (7) measure the fractional contribution of the resolved CXRB to the total CXRB. The ChaMP X-ray point source catalog contains ~6,800 X-ray sources detected in 149 Chandra observations covering wide sky area (~10 deg2) and provides X-ray photometric data in 8 different energy bands as well as X-ray spectral hardness ratios and colors. The differential number counts are well fitted by a broken power law. Soft sources are responsible for the breaks in the differential number counts. We measure upper and lower limits of resolved CXRB flux densities from the ChaMP and the ChaMP+CDFs number counts with and without bright target sources. The fractions of the resolved CXRB without target sources are 78 $\pm$1% and 81 $\pm$2% in the 0.5-2 keV and 2-8 keV bands, respectively. These fractions increase by 1% when target sources are included. The resulted parameters in this study are generally consistent with those in earlier studies, but are better constrained with smaller uncertainties.