NuSTAR Hard X-Ray Survey of the Galactic Center Region. II. X-Ray Point Sources

NuSTAR Hard X-Ray Survey of the Galactic Center Region. II. X-Ray Point Sources

We present the first survey results of hard X-ray point sources in the Galactic Center (GC) region by NuSTAR. We have discovered 70 hard (3-79 keV) X-ray point sources in a 0.6 deg² region around Sgr A* with a total exposure of 1.7 Ms, and 7 sources in the Sgr B2 field with 300 ks. We identify clear Chandra counterparts for 58 NuSTAR sources and assign candidate counterparts for the remaining 19. The NuSTAR survey reaches X-ray luminosities of similar to 4x and similar to 8 x 10^{32} erg s^{-1} at the GC (8 kpc) in the 3-10 and 10-40 keV bands, respectively. The source list includes three persistent luminous X-ray binaries (XBs) and the likely run-away pulsar called the Cannonball. New source-detection significance maps reveal a cluster of hard (>10 keV) X-ray sources near the Sgr. A diffuse complex with no clear soft X-ray counterparts. The severe extinction observed in the Chandra spectra indicates that all the NuSTAR sources are in the central bulge or are of extragalactic origin. Spectral analysis of relatively bright NuSTAR sources suggests that magnetic cataclysmic variables constitute a large fraction (>40%-60%). Both spectral analysis and logN-logS distributions of the NuSTAR sources indicate that the X-ray spectra of the NuSTAR sources should have kT > 20 keV on average for a single temperature thermal plasma model or an average photon index of Gamma = 1.5-2 for a power-law model. These findings suggest that the GC X-ray source population may contain a larger fraction of XBs with high plasma temperatures than the field population.

General information
State: Published
Organisations: National Space Institute, Astrophysics and Atmospheric Physics, Universite de Toulouse, Harvard-Smithsonian Center for Astrophysics, Columbia University, University of California at Berkeley, Russian Academy of Sciences, Pontificia Universidad Catolica de Chile
Number of pages: 32
Publication date: 2016
Peer-reviewed: Yes

Publication information
Volume: 825
Issue number: 2
Article number: 132
ISSN (Print): 0004-637x
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 4.41
Web of Science (2017): Impact factor 8.561
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 5.26
Web of Science (2016): Impact factor 8.955
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 4.8
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 4.57
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 4.85
Web of Science (2013): Impact factor 14.137
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes