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The First Hard X-Ray Survey of the Central 30 Parsec of the Galactic Center Searching for Faint High Mass X-Ray Binaries

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This investigation reports the finding of three potential High Mass X-ray Binary (HMXB) candidates using Nuclear Spectroscopic Telescope Array (NuSTAR) in the central 30 parsec of the Galactic Center (GC) near the supermassive black hole Sagittarius A*. With the follow-up data of the GC by NuSTAR which observed 70 new hard X-ray sources, we aimed to search for faint HMXBs. To determine high-mass infrared counterparts of M ⊠ 10 M⊙, we utilized the Spitzer IRAC GC survey and conducted source registration on Chandra observations to minimize the absolute astrometric errors, which are unique for each observation. Various characteristics of these HMXB candidates including stellar types, pulsations, and luminosities were analyzed by spectral and timing analysis. This was followed by a stellar density calculation to further verify that the high-mass infrared counterparts are associated with each of its HMXB candidates. This investigation shows the likelihood of the existence of other faint HMXBs in the GC that are undiscovered due to lack of sensitivity of previous telescopes.

Topic

Compact and diffuse sources in galaxies and in the Galactic Center

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