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

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This investigation reports the finding of three new High Mass X-ray Binary (HMXB) candidates using Nuclear Spectroscopic Telescope Array (NuSTAR) in the central 30 parsecs 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, this research aimed to search for previously undiscovered faint HMXBs. The spectrum of the three HMXBs showed classic signatures of the power law spectrum with a lack of iron line, and infrared observations indicate that these hard X-ray sources with X-ray luminosities in the1033erg/s range—100 times fainter than those of typical HMXBs—have a high mass companion star. Further timing analysis on these three hard X-ray sources supports that these are HMXB candidates. This investigation shows the likelihood of a substantive population of other faint HMXBs in the GC that are undiscovered due to lack of sensitivity of previous telescopes. It is also expected that analyzing the distribution of these new faint HMXBs will help model the number of gravitational wave events in our galaxy.

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