X-ray Emission from the Star Clusters Near the Galactic Center

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Abstract

The detection of two thermal X-ray sources from an extraordinarily compact massive star cluster, the Arches cluster (G0.12-0.02), is reported. This cluster is embedded within a bath of diffuse X-ray emission extending beyond the edge of the cluster to at least $90'' \times 60''$ (3.6 pc $\times$ 2.4 pc). The diffuse emission beyond the boundary of the cluster is discussed in the context of combined shocked stellar winds escaping from the cluster. The presence of such a high velocity wind flow has implications for other dense systems of mass-losing hot stars such as the IRS 16 at the Galactic center. IRS 16 consists of a number of hot mass-losing stars which could produce an X-ray emitting high cluster wind flow with a velocity of $\approx$1000 km s^{-1} as predicted by Canto et al. and detected in the Arches cluster. The interaction of such a hot cluster wind flow with Sgr A* may affect the mass accretion rate. We also present the distribution of the 6.4 keV emission from the Arches cluster as well as discuss the relationship between the X-ray filaments at the edge of the nonthermal radio filaments of the Arc.

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