

The Candidate Intermediate-Mass Black Hole in the Globular Cluster M54

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Ibata et al. reported evidence for density and kinematic cusps in the Galactic globular cluster M54, possibly due to the presence of a 9400 solar-mass black hole. Radiative signatures of accretion onto M54's candidate intermediate-mass black hole (IMBH) could bolster the case for its existence. Analysis of new Chandra and recent Hubble Space Telescope astrometry rules out the X-ray counterpart to the candidate IMBH suggested by Ibata et al. If an IMBH exists in M54, then it has an Eddington ratio of $L(0.3-8 \text{ keV}) / L(\text{Edd}) < 1.4 \times 10^{-10}$, more similar to that of the candidate IMBH in M15 than that in G1. From new imaging with the NRAO Very Large Array, the luminosity of the candidate IMBH is $L(8.5 \text{ GHz}) < 3.6 \times 10^{29} \text{ ergs/s}$ (3 sigma). Two background active galaxies discovered toward M54 could serve as probes of its intracluster medium.

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