

An accreting $< 10^5 M_{\odot}$ black hole at the center of dwarf galaxy IC750

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Abstract. Nuclear black holes in dwarf galaxies are important for understanding the low end of the supermassive black hole mass distribution and the black hole-host galaxy scaling relations. IC 750 is a rare system which hosts an AGN, found in $\sim 0.5\%$ of dwarf galaxies, with circum-nuclear 22 GHz water maser emission, found in $\sim 3\text{--}5\%$ of Type 2 AGNs. Water masers, the only known tracer of warm, dense gas in the center parsec of AGNs resolvable in position and velocity, provide the most precise and accurate mass measurements of SMBHs outside the local group. We have mapped the maser emission in IC 750 and find that it traces a nearly edge-on warped disk, 0.2 pc in diameter. The central black hole has an upper limit mass of $\sim 1 \times 10^5 M_{\odot}$ and a best fit mass of $\sim 8 \times 10^4 M_{\odot}$, one to two orders of magnitude below what is expected from black hole-galaxy scaling relations. This has implications for models of black hole seed formation in the early universe, the growth of black holes, and their co-evolution with their host galaxies.

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