

Abstract Submitted
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GS 2000+25: The Least Luminous Black Hole X-ray Binary JENNIFER RODRIGUEZ, RYAN URQUHART, Michigan State University, RICHARD PLOTKIN, University of Nevada, TERESA PANURACH, LAURA CHOMIUK, JAY STRADER, Michigan State University, JAMES MILLER-JONES, Curtin University, ELENA GALLO, University of Michigan, GREGORY SIVAKOFF, University of Alberta — We report new, strictly simultaneous radio and X-ray observations of the nearby stellar-mass black hole X-ray binary GS 2000+25 in its quiescent state. In deep *Chandra* observations we detect the system at a faint X-ray luminosity of $L_X = 1.1_{-0.7}^{+1.0} \times 10^{30} (d/2 \text{ kpc})^2 \text{ erg s}^{-1}$ (1–10 keV). This is the lowest X-ray luminosity yet observed for a quiescent black hole X-ray binary, corresponding to an Eddington ratio $L_X/L_{\text{Edd}} \sim 10^{-9}$. In 15 hours of observations with the Karl G. Jansky Very Large Array, no radio continuum emission is detected to a 3σ limit of $< 2.8 \mu\text{Jy}$ at 6 GHz. Including GS 2000+25, four quiescent stellar-mass black holes with $L_X < 10^{32} \text{ erg s}^{-1}$ have deep simultaneous radio and X-ray observations and known distances. These sources all have radio to X-ray luminosity ratios generally consistent with, but slightly lower than, the low state radio/X-ray correlation for stellar-mass black holes with $L_X > 10^{32} \text{ erg s}^{-1}$. Observations of these sources tax the limits of our current X-ray and radio facilities, and new routes to black hole discovery are needed to study the lowest-luminosity black holes.

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