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The Mass Distribution of Stellar-Mass Black Holes WILL FARR, NIHARIKA SRAVAN, Northwestern University, CIERA, ANDREW CANTRELL, LAURA KREIDBERG, CHARLES BAILYN, Yale University Department of Astrophysics, ILYA MANDEL, MIT Kavli Institute, VICKY KALOGERA, Northwestern University, CIERA — Until the first gravitational wave detection involving a stellar-mass black hole, X-ray binary systems provide the only observational window on the properties of these objects. We have used a sample of fifteen low-mass X-ray binary systems and five high-mass X-ray binary systems for which dynamical measurements of the black hole mass exist to place constraints on the mass distribution of stellar-mass black holes. We fit the low-mass X-ray binary black hole masses alone and the combined sample of twenty black hole masses to five parametric and five non-parametric models for the underlying mass distribution. We can extract useful information from this plethora of models because of new techniques we developed that allow for the efficient calculation of the relative Bayesian posterior probabilities of the models. Surprisingly from a theoretical perspective, we find strong evidence in both the low-mass and combined samples for a "mass gap" between the maximum neutron star mass of $\sim 3M_{\odot}$ and the minimum black hole mass, in agreement with studies from other groups; we find the minimum black hole mass to be $4.3M_{\odot}$ for the best-fitting model of the low-mass X-ray binaries and $4.5M_{\odot}$ for the best-fitting model of the combined sample (both at 90% confidence).

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