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Gravitational microlensing by binary black holes[1] DANIEL EILBOTT, JONATHAN COHN, ALEXANDER RILEY, MICHAEL KESDEN, LINDSAY KING, The University of Texas at Dallas — When a massive object passes in front of a distant light source, the light follows curved space-time, resulting in magnification of the source light and production of multiple images in a process known as gravitational lensing. Small-scale gravitational lensing where the lens is an effective point mass (e.g. a star or black hole) is referred to as microlensing. Though yet undetected, we expect stellar-mass binary black holes (BBHs) to exist and to have a microlensing signature that is, due to their larger masses and smaller separations, distinct from normal lensing objects. We calculate the light curves and image centroid shifts from lensing events that BBHs would produce and evaluate whether such events are observationally detectable by current technological means. To this end, we use Bayesian statistical techniques to compare statistical support for a BBH model vs. a single object model of the same total mass, taking into account the modern telescopes ability to detect perturbations in the light curve due to a candidate BBH. We show that, with current technology, only BBHs with separations that are a significant fraction of their Einstein radius would be detectable. We additionally explore the parameter space of BBHs to analyze detectability with near-future telescopes.

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