

Self-lensing is a process by which a compact object such as a black hole or neutron star gravitationally lenses its companion in an eclipsing binary system. Through examining the stellar light curve of the bright companion, one could deduce both the mass of the compact object and the inclination of its orbit. We have examined this concept in specific cases of eclipsing X-ray binary systems where the compact object is actively interacting with its companion star. Active systems could pose a challenge due to their intrinsic variability so we looked to minimize the noise caused by interactions by choosing an optimal wavelength that could circumvent both the variability and any contribution from the compact object's accretion disk. We found that observations in the near-infrared could reduce the contribution of the accretion disk in the light curve and would allow for observation of a self-lensing pulse. In high-mass X-ray binaries (HMXBs), Wolf-Rayet stars with black hole companions could produce measurable self-lensing pulses given that the lensing strength favors companions with smaller radii.

We have also begun examining the concept of self-lensing as applied to supermassive black hole (SMBH) binary systems. We have found that, when the background accretion disk is treated as an extended finite source, the maximum possible amplification is not anticorrelated with the size of the source when the system is inclined. We have found that the maximum flux increases possible in an inclined system can occur with larger source sizes, the value of which will be related to the inclination of the orbit.