

Wave optics of gravitational waves lensed by a Kerr black hole

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Gravitational waves sourced by binaries have long wavelengths that are in some cases comparable to Schwarzschild radius of low-mass halo or supermassive black holes. Wave effects due to their long wavelengths play an important role in investigating small-scale mass distributions reflecting dark matter natures. Studies of such effects often neglect the polarization of gravitational waves and hence treat them as scalar waves. However, recent studies show that the spin effects become increasingly prominent for longer wavelengths, although it remains within the range where wave effects are insignificant. We investigate gravitational waves lensed by a Kerr black hole, taking into account both wave effects and spin effects to confirm the validity of calculation neglecting polarization.

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