Title:	Gravitational lensing of gravitational wave packets
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Abstract:	The recent observation of GW150914 has led to the birth of a new field: Gravitational Wave Astronomy. With three currently active detectors, and a few more scheduled to be operational within the next decade or so, the relevance of this field is expected to vastly increase. Akin to electromagnetic radiation, the propagation of gravitational radiation is affected by local changes in the curvature of space-time. However, there is one crucial difference: the wavelength of gravitational waves that are of astrophysical interest are much larger than that of light, and hence wave effects may become important in some instances. In particular, wave effects cannot be ignored if the wavelength of radiation is comparable to the physical size of the gravitational lens. Unlike in the geometric optics regime where all frequency components are magnified by the same factor, wave effects introduce frequency dependent modulation. Based on the length of the signal in time domain, gravitational wave signals can be broadly classified into two types: signals can run for long periods of time, like the grav- itational wave signal produced during the in-spiral of two massive objects, or continuous gravitational waves produced by, for e.g., a rotating neutron star with an irregularity on its surface. As opposed to this, gravitational wave packets are short bursts of gravitational radiation, and as per current understanding, these do not exceed a time-length of one sec- ond. Another key difference is that the chirp signal is quasi-monochromatic, while the wave packets under consideration are not. In this MS thesis, we have aimed to study, and quantify, the distortions that can be induced in a gravitational wave packet as a result of gravitational lensing. For frequencies in the LIGO-band, wave effects are only important in the case of mi- crolensing. We have thus focused on the microlensing of gravitational wave packets. To connect with observations, we have simulated wave packets that are similar to those pro- duced during core-collapse supernovae. We hope that the results of this thesis will find applications in the future, when increased sensitivity of detectors will allow detection of multiple instances of lensed gravitational wave packets.
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