Środowe seminarium w Instytucie Fizyki

April 13th – 12:00

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"Wave-optics in Gravitational Waves lensed events"

In this talk, I will present the basic of gravitational lensing in the wave-optics regime, its application to Gravitational Waves and how to exploit GW lensed events for astrophysical and cosmological studies. The wave-optics regime is characterized by the fact that the size of the wave of the lensed signal is comparable to the size of the lens. This condition is (almost) never satisfied for electromagnetic signals, but could be for Gravitational Waves, where the frequency is much lower. First, I will introduce the lensing of Gravitational Waves, explaining when the geometrical-optics approximation breaks down and we have to treat the lensing in the wave-optics regime. Then, I'm going to present my work on how to put a constraint on the Hubble constant through lensed multi-messenger events. Connected to this, I will address the mass-sheet degeneracy problem in the lensing of GWs. Finally, I will introduce my latest work and explain how we can distinguish a lensed event from an unlensed one and how we can constrain the model of the lens. In this last point, I will stress the fact that a precise modelling on the lens can be of great importance for numerous astrophysical and cosmological issues, e.g. describing the dark matter component of galaxies or constraining modified gravity theories.