

Seminarium Astrofizyczne

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ID 349-387-373 Password: AstroSemi

Aleksandra Piórkowska-Kurpas

(August Chełkowski Institute of Physics, Faculty of Science and Technology, University of Silesia in Katowice)

Gravitational lensing of gravitational waves: perspectives for detection and lensing rates of inspiraling double compact objects in the future gravitational wave detectors.

With the first direct detection of gravitational wave (GW) signal registered by LIGO detectors a new branch of science - GW astronomy – has been opened up. Strong success of LIGO/Virgo interferometric detectors, resulting with numerous observations of GW signals (mainly BBH coalescences), encourages to consider the possibility of broadening deca- to kilo-Hertz range of GW spectrum to lower frequencies with planned new generation of ground-based (ET) and space-borne (LISA, DECIGO) GW detectors. This, in turn, creates a unique opportunity for multifrequency GW studies: ET and DECIGO would be able to observe double compact objects (DCOs) in the inspiraling stage, i.e. long time (weeks to years in the case of DECIGO) before they will be observable within hecto-Hertz band by LIGO/Virgo and recently, KAGRA, as DCO mergers. Moreover, it is expected that the result of a joint detection with DECIGO and ground-based detectors of 2nd and 3rd generation would be very rich statistics of DCOs translating not only on the improved greatly parameter estimation of such sources, but also makes possible that certain, non-negligible amount of DCOs will have a chance of being strongly lensed. I will present new perspectives for the detection rates of inspiraling DCOs in ET and DECIGO detectors, with using the population synthesis intrinsic inspiral rates of NS-NS, BH-NS and BH-BH systems. I will also show estimates of the expected gravitational lensing rates of such sources for those detectors. New possibilities emerging from multifrequency detections of lensed GW events will be also discussed.

Serdecznie zapraszam,
Agnieszka Majczyna