GR 11: Gravitationswellen

Zeit: Mittwoch 17:30–18:30 Raum: SFG 0140

GR 11.1 Mi 17:30 SFG 0140

Beating the standard sensitivity-bandwidth limit of cavity-enhanced interferometers with internal squeezed light generation — •Mikhail Korobko[1], Lisa Kleybolte[1], Stefan Ast[2], Haixing Miao[3], Yanbei Chen[4], and Roman Schnabel[1] — [1]Institut für Laserphysik und Zentrum für Optische Quantentechnologien, Universität Hamburg, Luruper Chaussee 149, 22761 Hamburg, Germany — [2]Institut für Gravitationsphysik, Leibniz Universität Hannover and Max-Planck-Institut für Gravitationsphysik (Albert-Einstein-Institut), Callinstraße 38, 30167 Hannover, Germany — [3]Institute of Gravitational Wave Astronomy, University of Birmingham, Birmingham B15 2TT, United Kingdom — [4]Caltech CaRT, Pasadena, California 91125, USA

The shot-noise limited sensitivity of cavity-enhanced interferometric measurement devices, such as gravitational-wave detectors, can be improved by increasing the cavity finesse, given the fixed light power inside the detector. This comes at a price of proportional reduction of the detection bandwidth. It is possible to overcome this standard sensitivity-bandwidth limit using non-classical correlations in the light field. Here, we investigate the internal squeezing approach, where the parametric amplification process creates a non-classical correlation directly inside the interferometer cavity. We analyse the limits of the approach theoretically, and measure 36% increase in the sensitivity-bandwidth product compared to the classical case. To our knowledge this is the first experimental demonstration of improving the sensitivity-bandwidth product using internal squeezing.

GR 11.2 Mi 17:50 SFG 0140

Astrophysical Gravitational Waves in Conformal Gravity — •Patric Hölscher[1], Chiara Caprini[2], and Dominik Schwarz[1] — [1]Bielefeld University, Bielefeld, Germany — [2]Astroparticle and Cosmology laboratory, Paris, France

We investigate the gravitational radiation from binary systems in Conformal Gravity and Massive Conformal Gravity. Therefore, we derive the inhomogeneous linearized field equations for the metric which are given by a massive Klein-Gordon equation.

To calculate the radiated energy we follow the standard method by deriving an expression for the gravitational energy-momentum tensor. In order to explain the decrease of the orbital period of binary systems we use data from the analysis of galaxy rotation curves and from the well-measured binary system PSRJ1012+5307.

Our result is that there is nearly no decrease of the orbital period. This means that gravitational radiation is not effective and there has to be another mechanism to explain the shrinkage of the orbital period of binary systems.

GR 11.3 Mi 18:10 SFG 0140

Quasinormal modes of perturbed black holes in Einstein-dilaton-Gauss-Bonnet gravity — Jose Luis Blazquez-Salcedo[1], Caio F. B. Macedo[2], Vitor Cardoso[3], Valeria Ferrari[4], Leonardo Gualtieri[5], •Fech Scen Khoo[6], Jutta Kunz[7], and Paolo Pani[8] — [1]University of Oldenburg, Oldenburg, Germany — [2]Universidade de Lisboa, Lisboa, Portugal — [3]Universidade de Lisboa, Lisboa, Portugal — [4]Sapienza Universita di Roma, Sezione INFN Roma1, Roma, Italy — [5]Sapienza Universita di Roma, Sezione INFN Roma1, Roma, Italy — [6]Jacobs University, Bremen, Germany — [7]University of Oldenburg, Oldenburg, Germany — [8]Sapienza Universita di Roma, Sezione INFN Roma1, Roma, Italy

We will discuss the gravitational waves emitted by distorted black holes in a gravity theory that extends general relativity to include the coupling of a scalar field (dilaton) and the topological Gauss-Bonnet invariant which is second order in curvature. We will be focusing in this talk on the quasinormal modes which are most relevant for the ringdown phase of the gravitational waves, where we explore the linear mode stability of the black holes against axial and polar perturbations.