



Sommerfeld Theory Colloquium

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Advances and Challenges in Solving the Two-Body Problem in General Relativity

Since the discovery of the first binary black-hole merger in 2015, analytical and numerical solutions to the relativistic two-body problem have been essential for the detection and interpretation of more than 100 gravitational-wave signals from compact-object binaries. Future experiments will detect black holes at cosmic dawn, probe the nature of gravity and reveal the composition of neutron stars with exquisite precision. Theoretical advances (of up to two orders of magnitude in the precision with which we can predict relativistic dynamics) are needed to turn gravitational-wave astronomy into precision laboratories of astrophysics, cosmology, and gravity. In this talk, I will discuss recent advances in modeling the two-body dynamics and gravitational radiation, review the science that accurate waveform models have enabled with LIGO-Virgo gravitational-wave observations, and highlight the theoretical challenges that lie ahead to fully exploit the discovery potential of increasingly sensitive detectors on the ground, such as the Einstein Telescope and Cosmic Explorer, and in space, such as the Laser Interferometer Space Antenna (LISA).

Wednesday, 24 April 2024, 16:15h, Room A348, Theresienstr. 37/III

Prof. D. Lüst and Prof. S. Mukhanov