



EINLADUNG
ZUM
THEORETISCH-PHYSIKALISCHEN KOLLOQUIUM

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***From condensed matter to quantum
gravity: Quantum effects between
neutron stars and the gravitational
Casimir-Polder force***

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We recently entered the era of gravitational wave astronomy along with the intriguing possibility of new discoveries in the realm of general relativity.

Since September 14, 2015 when the LIGO (Laser Interferometer Gravitational-Wave Observatory) experiment observed the first ever measured gravitational wave signal, several other gravitational wave signals from pairs of coalescing black holes and neutron stars have been detected.

In this talk, I will present the computation of an exact quantum correction to the gravitational potential between such objects, and any gravitationally polarizable objects. The result is the exact generalization of the famous Van de Waals Force in electromagnetism and the more general Casimir-Polder to gravity. This new force is computed from the shift in vacuum energy of metric fluctuations due to the gravitational polarizability of the objects. The computation is shown for the potential energy at arbitrary distances compared to the wavelengths in the system, including the far and near regimes. In the far distance, or retarded, regime, the potential energy takes on a particularly simple form. Finally, I will provide estimates of this effect when applied to neutron stars.