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A classical field treatment of gravitational fluctuation forces: From the space-time foam to neutron star merger interactions

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In this presentation, we discuss a treatment of Casimir-Polder gravitational fluctuation forces based on a classical general relativistic gravitational field framework. In analogy with the acoustic Casimir effect, we analyze the interaction between high density neutron star surfaces within a bath of classical gravitational waves. We extend a previously published treatment of the interaction of gravitationally polarizable particles within a zero-point gravitational field, also including mixed gravitational-electrodynamical potentials. Finally, we consider the exploitation of “fluctuations of fluctuation forces” on very short time-scales as possible magnification strategies in the detection of such interactions on an elementary particle scale, such as in neutron-neutron and neutron-wall scattering processes. The epistemological implications of our findings in the search for unique quantum gravity signatures are explored.

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