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Casimir effect in a weak gravitational field: ”Schwinger’s approach”

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In this paper we discuss the Casimir effect in a small cavity at rest in the weak gravitational field of a massive, non-rotating source.
We propose a new approach, based upon Schwinger’s effective action method, showing that the gravitational interaction induces a small correction in the vacuum energy density, in full agreement with the result we obtained in a previous work (Sorge F 2005 Class. Quantum Grav. 22 5109), following a standard field mode decomposition technique.
The present result reinforces the belief that gravity can indeed be effective in modifying the vacuum energy of a quantum field confined to the cavity, against the recent claim (Lima A P C M, Alencar G, Muniz C R and Landim R R 2019 JCAP 7 11) that a weak gravitational field has no influence on the Casimir energy.

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