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To all members of the
Faculty of Physics

Vienna, 12 November 2024

Invitation to the public defense of the doctoral thesis

**“Evolution of confined quantum fields in curved
spacetime: application to dynamical Casimir effect with
screened scalar fields”**

by

Ana LuciaBaez Camargo Aguilar

Tuesday, 19 November 2024, 15:00 p.m.

Digital:

<https://univiennea.zoom.us/j/67918799020?pwd=8RZQqYM44pbG12hvSQ5IcnrHeX6R87.1>

We develop a method to describe the evolution of a confined quantum scalar field affected by changes in the background geometry and/or the confining boundaries. To prove its validity, we implement the method in known examples. Moreover, we also apply it to study a confined quantum field perturbed by gravitational waves. Finally, we employ this method to study the dynamical Casimir effect in the presence of a chameleon field, which is a dark energy/dark matter candidate. By showing that the particle production is reduced due to the presence of a chameleon field, we propose a new direction for constraining these models. The method proves useful for studying relativistic effects on confined quantum systems. Furthermore, this method is able to address relevant effects beyond general relativity on quantum fields. We expect that our method will become a standard tool in the growing research area of quantum field theory in curved spacetimes for confined fields.

Defense committee:

Mario Pitschmann, Technische Universität Wien, AT (reviewer)

Maria Luisa Chiofalo, Università di Pisa, IT (reviewer)

Ivette Fuentes Guridi (supervisor)

Thomas Pichler (chair)