

# PHYSICS AND ASTRONOMY COLLOQUIUM

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Vacuum Energy Density and Pressure Near Boundaries

The Casimir effect is an attraction between electrical conductors attributable to modification of the QED energy in the space between them. To understand the physics and mathematics of such situations we need to calculate the components of the stress tensor at each point. We study primarily a scalar field model. In general, idealized boundaries (“hard walls”) induce divergent surface energies. Inserting a finite ultraviolet cutoff leads to two inconsistent formulas for the force on a boundary. Replacing the hard wall by a power-law potential (“soft wall”) solves that problem. Analyses of both hard and soft walls require ideas and techniques from the theory of quantum fields in curved space developed in the 1970s. Numerous TAMU undergraduate physics majors have been involved in this research project, which also involves collaborators at the University of Oklahoma and elsewhere.



**THURSDAY, MARCH 24, 2016 | 4:00 PM | HAWKING AUDITORIUM**



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TEXAS A&M UNIVERSITY