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Precision measurements of the Casimir force at Low temperatures[1] RODRIGO CASTILLO-GARZA, UMAR MOHIDEEN, Physics and Astronomy Dept. UC Riverside — We will present research involving the precision measurement of the Casimir force at low temperatures. The role of material losses in this force and its incorporation into the Lifshitz theory remains unresolved. The Casimir force results from the modification of the zero point photon spectrum due to the presence of boundaries. The problem arises when the Casimir force is calculated at non zero temperature, where the role of thermal photons have to be included to that of the zero point photons. We plan to address this problem by measuring the Casimir force for different materials as a function of the temperature. Currently we are involved in making precision measurements of the Casmir force at 6K, 77K, and 300K with a micro cantilever based system that we have designed and built at UC-Riverside. The high sensitivity of this instrument will provide us with the resolution to advance our understanding of the interactions of both virtual photons and real photons when confined to a semi-infinite cavity made out of real metals. The constructed apparatus will also provide a deeper understanding of the role vacuum fluctuations play when the cavity constituents are made of a combination of dielectric, superconductor, and metal surfaces.

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