

Measurement of the Casimir force between two rectangular gratings

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One of the remarkable properties of the Casimir force is its non-trivial dependence on the shape of the interacting objects. Experiments using the corrugated surface of gratings [1, 2] have demonstrated the deviation of the Casimir force from the proximity force approximation. In these experiments one of the bodies was chosen to be a sphere to circumvent alignment difficulties. Here, we present measurement of the Casimir force gradient between two silicon structures, both of which contain rectangular corrugations. By using lithography to define the structures [3, 4], they are aligned to allow the two gratings to interpenetrate when the separation between them is reduced. Our data shows a number of novel features, including strong deviations of the force gradient from the proximity force approximation and a non-zero, distance-independent Casimir force over certain range of displacement.

References

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