Manipulating Dispersion Forces with Superlattice Nano-structures

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Quantum friction is a drag force mediated by the electromagnetic vacuum fluctuations acting on an object in relative motion with respect to another. The characteristics of this interaction depend on the physical properties of the material composing the bodies as well as the geometric details of their nano-structures. We address two connected aspects of this non-equilibrium dispersion force: its strength and its behavior as a function of the kinematic and geometrical parameters that characterize the system. Specifically, we investigate the electromagnetic response of a superlattice structure, focusing on the low frequency plasmonic properties of the system and on the corresponding electromagnetic density of states. Since quantum friction strongly depends on these features, by tailoring the properties and the geometry of the material we can control the drag force [1].

References

[1] M. Oelschläger, F. Intravaia, K. Busch, Nonequilibrium atom-surface interaction with lossy multilayer structures, arXiv:1804.01453 (*accepted*) (2018)