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Negative Casimir Entropies in Nanoparticle Interactions[1] KIMBALL MILTON, Univ of Oklahoma, ROMAIN GUEROUT, Laboratoire Kastler-Brossel, CNRS, ENS, UPMC, Case 74, F-75252 Paris, France, GERT-LUDWIG INGOLD, Institut für Physik, Universität Augsburg, Universitätsstraße 1, D-86135 Germany, ASTRID LAMBRECHT, SERGE REYNAUD, Laboratoire Kastler-Brossel, CNRS, ENS, UPMC, Case 74, F-75252 Paris, France — Negative entropy has been known in Casimir systems for some time. For example, it can occur between parallel metallic plates modelled by a realistic Drude permittivity. Less well known is that negative entropy can occur purely geometrically, say between a perfectly conducting sphere and a conducting plate. The latter effect is most pronounced in the dipole approximation, which occurs when the size of the sphere is small compared to the separation between the sphere and the plate. Therefore, here we examine cases where negative entropy can occur between two electrically and magnetically polarizable nanoparticles or atoms, which need not be isotropic, and between such a small object and a conducting plate. Negative entropy can occur even between two perfectly conducting spheres, between two electrically polarizable nanoparticles if there is sufficient anisotropy, between a perfectly conducting sphere and a Drude sphere, and between a sufficiently anisotropic electrically polarizable nanoparticle and a transverse magnetic conducting plate.

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