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# Casimir effect in 3+1 dimentional lattice Abelian and non-Abelian gauge theories

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Compact U(1) gauge theory in 3+1 dimensions possesses the confining phase which is characterized by a linear raise of the potential between particles with opposite electric charges at sufficiently large inter-particle separation. This phenomenon is closely related to the color confinement in non-Abelian gauge theories such as QCD. In QED the condensation of Abelian monopoles at strong gauge coupling leads to confinement of electric charges because monopole condensate squeezes the electric flux into a thin electric tube which plays the role of confining string. We investigate how the vacuum structure of the theory is influenced by adding ideally conducting parallel plates associated with Casimir effect which predicts that the energy of vacuum fluctuations is modified by the presence of physical bodies. Using first-principal numerical simulations in compact U(1) lattice gauge theory we have found that as the distance between the plates diminishes, the vacuum between the plates undergoes a deconfining transition and the phase transition point shifts towards weaker gauge coupling. The phase diagram in the space of the lattice gauge coupling and the inter-plate distance is obtained. We also discuss our new results on the non-Abelian Casimir effect in SU(3) gauge theory.

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