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Casimir energy in the Curci-Ferrari model through a functional approach

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Content

Using functional integral methods, we investigate the non-Abelian Casimir energy in the Curci-Ferrari model, which offers an effective description of the infrared regime of Yang-Mills theory. We consider a system of two infinite parallel plates with either perfect magnetic conductor (PMC) or perfect electric conductor (PEC) boundary conditions. Imposing the boundary conditions directly in the functional integral by the introduction of suitable auxiliary fields, we obtain a boundary effective action that captures the dynamics of this system and allows us to compute the Casimir energy. Unlike in QED, we find that the Casimir energy for PEC and PMC conditions differs by a constant factor, which can be traced back to a van Dam-Veltman-Zakharov-like discontinuity. Our analytical results are compatible with a variety of recent numerical lattice simulations of the non-perturbative Yang-Mills Casimir energy, in which a novel non-perturbative mass scale emerges.

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