

IAS Program on High Energy Physics (HEP 2021)



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On RG flows near a UV and quantum, 1st order phase transition - A profile of a Higgs mechanism

We construct the zero temperature (no compact dimensions) effective action for an $SU(2)$ Yang-Mills theory in five dimensions, with boundary conditions that reduce the symmetry on the four-dimensional boundary located at the origin to a $U(1)$ -complex scalar system. In order to be sensitive to the Higgs phase, we need to include higher dimensional operators in the effective action, which can be naturally achieved by generating it by expanding the corresponding lattice construction in small lattice spacing, taking the naive continuum limit and then renormalizing. In addition, we build in the effective action non-perturbative information, related to a first order quantum phase transition known to exist. As a result, the effective action acquires a finite cut-off that is low and the fine tuning of the scalar mass is rather mild.

Scheduling Preferences

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