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Numerical results for gauge theories near the conformal window

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A novel strong interaction beyond the standard model could provide a dynamical explanation of electroweak symmetry breaking. Experimental results strongly constrain properties of models that realise this mechanism. Whether these constraints are obeyed by any strongly interacting quantum field theory is a non-perturbative problem that needs to be addressed by first-principle calculations. Monte Carlo simulations of lattice regularised gauge theories is a powerful tool that enables us to address this question. Recently various lattice investigations have appeared that have studied candidate models of strongly interacting dynamics beyond the standard model. After a brief review of the main methods and of some recent results, we focus on the analysis of $SU(2)$ gauge theory with one adjoint Dirac fermion flavour, which is shown to have a near-conformal behaviour with an anomalous dimension of order one. The implications of our findings are also discussed.

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