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Grand unification and the Planck scale: An SO(10) example of radiative symmetry breaking

Grand unified theories remain an appealing proposal to reduce the number of free parameters in the gauge-Yukawa sector of the Standard Model. However, to realise the Standard Model at low energies, the unified symmetry group has to be partially broken by a suitable scalar potential in just the right way.

In my talk, I will discuss a systematic study of radiative symmetry breaking to constrain viable initial conditions at the Planck scale.
The resulting constraints on an admissible scalar potential with well-known constraints in the gauge-Yukawa sector into a blueprint that carves out the viable effective-field-theory parameter space of any underlying theory of quantum gravity.
I will discuss the constraining power of our blueprint within a non-supersymmetric SO(10) GUT containing a 16H - and a 45H -dimensional scalar representation. The requirement of successful radiative symmetry breaking to the correct vacuum expectation value subgroups significantly constraints the underlying microscopic dynamics.

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