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Minimal SU(6) Gauge-Higgs Grand Unification

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Gauge-Higgs Grand Unified Theories (GHGUT) embedded in a 5D spacetime unify the gauge symmetries of nature together with their breaking sector, at the same time providing a solution to the gauge hierarchy problem, the flavour puzzle, and the doublet-triplet splitting problem. In this talk, I will discuss the recently proposed 5D warped space GHGUT setup with an SU(6) bulk gauge group, where the 5D gauge field contains the conventional SU(5) GUT gauge bosons and a scalar sector, which includes the Higgs field, as the fifth component of 5D gauge bosons. With suitably chosen boundary conditions that break SU(6) down to the SM gauge group, all the SM fermion masses and mixings are reproduced with a minimal fermion content. Moreover, the problem of light exotic Kaluza-Klein fermions, which generically appear in GHGUTs, is avoided. The scalar sector comprises three fields, namely the SM Higgs, a leptoquark (LQ), and a singlet. The scalar potential is computed at one loop, leading to realistic Higgs masses mh ˜ 125 GeV, and TeV-scale masses for the LQ and the singlet, potentially within reach of the LHC. I will also show that, although the coloured GUT gauge bosons (scalar LQ) have masses in the multi-TeV (TeV) range, proton decay is forbidden by a baryon number symmetry following from the SM fermion embeddings in SU(6). Finally, I will highlight some flavour constraints coming from flavour changing neutral current (FCNC) processes.

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