

SO(10) at the LHC

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We study and compare various Zmodels arising from SO(10), focussing in particular on the Abelian subgroup $U(1)_R \times U(1)_{B-L}$, broken at the TeV scale to Standard Model hypercharge $U(1)_Y$. The gauge group $U(1)_R \times U(1)_{B-L}$, which is equivalent to the $U(1)_Y \times U(1)_\chi$ in a different basis, is well motivated from SO(10) breaking and allows neutrino mass via the linear seesaw mechanism. Assuming supersymmetry, we consider single step gauge unification to predict the gauge couplings, then consider the detection and characterisation prospects of the resulting Z at the LHC by studying its possible decay modes into dileptons as well as into Higgs bosons. The main new result here is to analyse in detail the expected leptonic forward-backward asymmetry at the high luminosity LHC and show that it may be used to discriminate the $U(1)_R \times U(1)_{B-L}$ model from the usual $B-L$ model based on $U(1)_Y \times U(1)_{B-L}$.

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