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Low scale Left-Right symmetry: phenomenology and first bounds from LHC

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Low scale restoration of Left-Right symmetry is reviewed, with emphasis of the possibility of its striking detection at LHC up to 4 TeV thanks to low scale Lepton-Number-Violation, which may turn out to be required by the claimed evidence and the future studies of neutrinoless double-beta decay, clashing with tightening constraints from cosmology. I focus on the minimal SU(2)L × SU(2)R × U(1)B–L gauge theory reviewing the two possibilities Left-Right symmetry defined as as parity or charge conjugation. A complete study of the quark mass matrices and the associated left and right mixing matrices shows that the limits from flavour-changing and CP violation are as low as M_WR>2.5TeV, and in addition the low scale WR-mediated processes can resolve the current mild discrepancy of the SM with CP violation in the B sector. Thus, the new gauge bosons are accessible at the Large Hadron Collider with spectacular signatures of LNV. The preferred case is Left-Right symmetry coinciding with generalized charge-conjugation, fitting nicely with the SO(10) GUT embedding. I further describe the interplay with LFV, and finally the first bounds derived from the current (CMS) LHC data.

Author: Dr NESTI, Fabrizio

Presenter: Dr NESTI, Fabrizio

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