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Fredy Alexander Ochoa Perez
CERN, HELEN Program

Proton-proton dispersion at the LHC is studied under a general framework of the 331 models, which are characterized by two symmetry breaking scales [1]. In order to study Higgs production, the spectrum of the Higgs sector (with 10 physical scalar fields) is obtained in mass eigenstates and their couplings to gauge and quark sector are determined. All the tree level couplings with 3 neutral gauge bosons (photon, Z, Z'), 6 charged gauge bosons (W,K1,K2) and quarks (including 3 new exotic quarks J1, J2, J3) have already been found. The Yukawa sector is similar to the Standard Model with two Higgs Doublets type III (2HDM-III) [2], where Flavor Changing Neutral Currents (FCNC) arise in the couplings with heavy neutral Higgs. However, and in contrast with the 2HDM type III, the 331 model contains two different scale parameters: the Vacuum Expectation Value (VEV) of the first symmetry breaking (higher scale) and two VEV at the electroweak scale, from where a decoupling limit at the electroweak scale to the minimal Standard Model (SM) follows naturally, and a SM-like neutral Higgs boson without FCNC is obtained without any other constraint. The FCNC in the heavy neutral Higgs sector suggest us a texture-type structure in the quark mass matrices in order to reproduce the CKM mixing angles and avoid large FCNC contributions [2]. This calculation is in process to be obtained.

On the other hand, gluon fusion is the main production mechanism for Higgs bosons in proton-proton collision at the LHC [3]. Under the framework of the construction described above, the next step is to calculate cross sections in Deep Inelastic Scattering (DIS) that gives some information about neutral and charged Higgs bosons. Numerical calculations are intended to be carried out through Monte-Carlo methods.

Bibliography

[1] F. Pisano and V. Pleitez, Phys. Rev. D46, (1992) 410; R.A. Diaz, R. Martinez and F. Ochoa, Phys. Rev. D72, (2005) 035018.

[2] T.P Cheng and M. Sher, Phys. Rev. D35, (1987) 3484; K. Matsuda and H. Nishiura, Phys. Rev. D69, (2004) 053005.

[3] H.M. Georgi et. al., Phys. Rev. Lett. 40, 11 (1978); D. Graudenz, M. Spira and P.M. Zerwas, Phys. Rev. Lett. 70, 10 (1993).