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FCNC in non-Abelian discrete flavor symmetry with SUSY

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This talk based on "Tri-bimaximal Mixing and Cabibbo Angle in S(4) Flavor Model with SUSY", arXiv:1004.5004 (PRD in press 2010),
"Non-Abelian Discrete Symmetries in Particle Physics", Prog. Theor. Phys. Supplement, No. 183 (2010), and
"Delta(54) Flavor Model for Leptons and Sleptons", JHEP 0912:054, 2009.
These works are collaborated with Tatsuo Kobayashi, Morimitsu Tanimoto, et al.

Non-Abelian discrete symmetry can lead to tri-bimaximal mixing, since non-Abelian discrete symmetry connects different generations. Especially, A(4) flavor symmetry gives the tri-bimaximal mixing at first. However, it is difficult to explain mixing of both quarks and leptons clearly. Therefore, our purpose is building a new model with non-Abelian discrete flavor symmetry S(4), which can explain both lepton mixing and quark mixing. Then, we present a flavor model of quarks and leptons with the non-Abelian discrete symmetry S(4) in the framework of
the SU(5) SUSY GUT. We predict the Cabibbo angle as well as the tri-bimaximal mixing of neutrino flavors. The non-Abelian discrete flavor symmetry constrains not only quark/lepton mass matrices, but also mass matrices of their superpartner, i.e. squark/slepton. Then, we study SUSY breaking terms in the slepton sector. Our model suppresses flavor changing neutral currents compared with the present experimental bounds.

Summary

Non- Abelian discrete symmetry leads to tri-bimaximal mixing. However, it is difficult to explain mixing of both quarks and leptons clearly. Then, we have presented a flavor model with the S(4) symmetry to unify quarks and lepton in the framework of the SU(5) SUSY GUT. Our model predicts the quark mixing as well as the tri-bimaximal mixing of leptons. Especially, the Cabibbo angle is predicted to be around 15 degree. We have also studied slepton sector. In our model, three families of left-handed slepton masses are degenerate and two right-handed sleptons are degenerate. Taking into account corrections due to the flavor symmetry breaking, our model predicts the magnitude of FCNC, which is compared with the present experimental bounds. In the left- and right-handed slepton mass matrices, mass insertion parameters /delta(LL)[12] and /delta(RR)[12] are predicted to be 10^(-4), while the experimental value is smaller than 10^(-3). In the A-terms, mass insertion parameter /delta(LR)[12] is predicted to be 5*10^(-6), while experimental value is smaller than 10^(-6).

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