ID de Contribution: **14** Type: **Non spécifié**

CP phases in leptonic flavour violation

mercredi 10 mars 2010 10:25 (15 minutes)

We study a CP and T violating triple (spin) correlation in the muon to electron conversion in nuclei in the context of the seesaw mechanism. After concluding that the results are negative for all three seesaw types, we turn to the left-right symmetric theories as the original source of seesaw. We find that in general this correlation is of order one which offers a hope of observing CP violation in lepton flavor violating processes for a L-R scale below around 10-30 TeV. We discuss the conditions that could render to (unlikely) conspiracies as to suppress the CP violating effects.

Summary

The muon conversion in nuclei is a very promising probe of charged lepton flavor violation and planned experiments will improve on current bounds by 4-6 orders of magnitude in near future. If a signal is found, additional information sensitive to CP phases can be obtained by studying a triple spin correlation, basicaly by measuring the transeverse polarization of the outgoing electron. We show that if the signal is due to any of the seesaw types, this correlation vanishes. However, if parity is restored at a fairly low scale (below 10-30 TeV), it could be of order one and if found to be so, may greatly motivate the search for the right-handed interactions at colliders, such as the LHC.

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Classification de Session: Rare processes as probes of beyond the SM