g factor of the charged leptons in noncommutative spacetime

M Haghighat\textsuperscript{1} and N Mortazavi\textsuperscript{2}

1. Department of Physics, Isfahan University of Technology, Isfahan, Iran
2. Department of Physics, Zanjan University, Zanjan, Iran

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Abstract
The g-factor of the charged leptons has always been considered by many physicists, both experimentaly as well as theoretically. In fact the electron and muon g-factor play the main role in testing the QED as well as the standard model. Meanwhile, there is a discrepancy between the standard model prediction of the muon anomalies magnetic moment and its experimental determination as large as $\frac{(25.5 \pm 8.0) \times 10^{-10}}{}$. Therefore the g-factor can be used as the best place to study the new physics beyond the standard model. In this article, we consider the g-factor of the lepton in the noncommutative space time as a new physics model. In the ordinary theory, Schwinger evaluated the first correction to the g-factor of free electron, which arises from the electron interaction with photon at one loop level in the QED. In noncommutative space time, we show that at one loop, there is an NC-contribution to the g-factor of leptons which leads to a new bound on the noncommutative parameter (NC parameter). The obtained bounds are comparable with the current bounds on the NC-parameters of the order TeV.

Keywords: magnetic moment of charged lepton, noncommutative QED, lepton-photon vertex in noncommutative space-time

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