Non-commutative field theory and the parameters of Lorentz violation in QED

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(Received 6 January 2011 ; in final form 24 June 2011)

Abstract
Non-commutative field theory as a theory including the Lorentz violation can be constructed in two different ways. In the first method, the non-commutative fields are the same as the ordinary ones while the gauge group is restricted to U(n). For example, the symmetry group of standard model in non-commutative space is U(3)×U(1) which can be reduced to SU(3)×SU(2)×U(1) by two appropriate spontaneous symmetry breaking. In contrast, in the second method, the non-commutative gauge theory can be constructed for SU(n) gauge group via Seiberg-Witten map. In this work, we want to find the relation between the NC-parameter and the Lorentz violation parameters for the first method and compare our results with what is already found in the second one. At the end, we obtain new limits on non-commutative parameter by using the existing bounds on the Lorentz Violation parameters.

Keywords: non-commutative field theory, Lorentz violation, Seiberg-Witten map

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