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Supersymmetry with Ghosts

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The role of higher derivative operators in 4D effective field theories is discussed in both non-supersymmetric and supersymmetric contexts. It is showed that theories with higher derivative operators do not always have an improved UV behaviour as usually considered, due to subtleties related to the analytical continuation from the Minkowski to the Euclidean metric. Radiative corrections in the presence of these operators are carefully considered. In the supersymmetric context of the O'Raifeartaigh model of spontaneous supersymmetry breaking with a higher derivative (supersymmetric) operator, it is found that quadratic divergences are nevertheless present in the one-loop self-energy of the scalar field. Similar conclusions apply to explict soft supersymmetry breaking (Wess-Zumino model) in the presence of these operators. These results depend, however, on the analytical continuation (Minkowski-Euclidean) that one has to make/choose and this is discussed to some detail. In both models, the UV logarithmic behaviour is restored in the decoupling limit of the associated ghosts.
Based on arXiv:hep-th/0608094 and additional work in progress.

Author: Dr GHILENCEA, Dumitru (University of Oxford, Physics Dept)

Presenter: Dr GHILENCEA, Dumitru (University of Oxford, Physics Dept)

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