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Perturbative vs non-perturbative renormalization: the case of the quark mass

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Comparing perturbative and non-perturbative results for renormalization constants has been an issue for a while. The quark mass renormalization constant is a prototype example: discrepancies between different results have been several times ascribed to this issue. Given the logarithmic nature of the divergence, there is no theoretical obstruction to a perturbative computation. The problem, as it is well known, is how to perform the computation at high loops. Truncation errors should in turn be compared to a variety of errors (e.g. irrelevant effects, chiral extrapolation, finite size) which should be carefully assessed as well.

We present our new results from Numerical Stochastic Perturbation Theory, in particular for the tree level Symanzik improved gauge action at $n\_f=2$. The goal is to take all the sistematic effects under control at three loop level.

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talk

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