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Quark mass effects in gradient-flow observables

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In recent years the perturbative approach to the short flow time expansion (STFX) of the gradient flow has been used in a variety of applications, such as meson mixing, for comparison to data from lattice field theory. These computations have usually utilised the method of projectors, which necessitates vanishing quark masses. However, it has been suggested by Hiromasa et. al. that the full mass effects of vacuum expectation values of operators within the SFTX can be used for precision determination of quark masses when used in conjunction with similar lattice results. While the mass effects of various processes are known in the literature to the two loop level, in this talk we discuss the computation of the vacuum expectation values of the flowed fermion and gluon condensates and the fermion kinetic operator within perturbation theory to the three loop level numerically using ftint.

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