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SMOM - $\overline{\text{MS}}$ Matching for B_K at Two-loop Order

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The Kaon bag parameter, B_K, is a key non-perturbative ingredient in the search for new physics through CP-violation. It parameterizes the QCD hadronic matrix element of the effective weak $\Delta S = 2$ four quark operator which can only be computed non-pertubatively on the lattice. The perturbative matching of B_K between the lattice renormalization schemes and $\overline{\text{MS}}$ scheme has been done before at one-loop order. In this talk I am going to present a calculation of the conversion factors for B_K between the four non-exceptional RI-SMOM schemes and the $\overline{\text{MS}}$ scheme at two-loop order in pertubation theory. The calculation is performed using the loop integral solving techniques such as integration by parts and sector decomposition.

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