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Non-perturbative renormalization by decoupling

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We show that the strong coupling can be accurately determined with the help of the running coupling in the pure gauge theory. We use a low energy scale computed in the three-flavor theory with heavy quarks, together with the non-perturbative running in pure gauge from 800 MeV to the electroweak scale to determine the three-flavor Lambda parameter accurately and in agreement with current knowledge. The method is quite general and can be applied to solve other renormalization problems (like the determination of quark masses), using finite or infinite volume intermediate renormalization schemes.

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