

Two loop $\overline{\text{MS}}$ Gribov mass gap equation with massive quarks

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Corrigendum

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The original QGRAF set-up for the construction of the Feynman diagrams used in [1] was incorrect. Hence this resulted in an incorrect expression for the explicit two loop $\overline{\text{MS}}$ corrections to the Gribov gap equation for the gluonic sector. The correct expression for the case of massless quarks is

$$\begin{aligned}
 1 = C_A \left[\frac{5}{8} - \frac{3}{8} \ln \left(\frac{C_A \gamma^4}{\mu^4} \right) \right] a + & \left[C_A^2 \left(\frac{3893}{1536} - \frac{22\,275}{4096} s_2 + \frac{29}{128} \zeta(2) - \frac{65}{48} \ln \left(\frac{C_A \gamma^4}{\mu^4} \right) \right. \right. \\
 & + \frac{35}{128} \left(\ln \left(\frac{C_A \gamma^4}{\mu^4} \right) \right)^2 + \frac{411}{1024} \sqrt{5} \zeta(2) - \frac{1317\pi^2}{4096} \left. \right) \\
 & + C_A T_F N_f \left(\frac{\pi^2}{8} - \frac{25}{24} - \zeta(2) + \frac{7}{12} \ln \left(\frac{C_A \gamma^4}{\mu^4} \right) - \frac{1}{8} \left(\ln \left(\frac{C_A \gamma^4}{\mu^4} \right) \right)^2 \right) \left. \right] a^2 \\
 & + O(a^3). \tag{1}
 \end{aligned}$$

Therefore the N_f independent part of (4.1) at two loops needs to be replaced by the corresponding two loop N_f independent part of this gap equation, (1). This does not alter the fact that the Kugo–Ojima confinement criterion is still valid at two loops.

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References

- [1] Gracey J A 2006 *Phys. Lett. B* **632** 282