Hadronic Light-by-Light Contributions to the Muon $g-2$ [Phys. Rev. Lett. 75, 1447 (1995)]

Johan Bijnens, Elisabetta Pallante, and Joaquím Prades

In the calculation of the contribution of the second diagram in Fig. 2(b), a global normalization factor was erroneously applied twice. Unfortunately, this changes the conclusions of our Letter rather significantly. Full details of this work and this Erratum will be given in a forthcoming publication. Below is Table I corrected.

The situation is qualitatively different with respect to the one in the Letter since the pseudoscalar exchange contribution is now dominant and very large. In the Letter we used nonet symmetry to estimate it, i.e., we kept its full leading $\mathcal{O}(N_c)$ contribution since adding the largest source of $1/N_c$ corrections only changed the result within the quoted final error. These corrections come from the effects of the $U(1)_A$ anomaly. This leaves the π^0 exchange as the dominant contribution to the muon $g-2$. We have taken into account the $U(1)_A$ anomaly effect by using the physical π^0, η, and η' mass eigenstates as propagating states. Their contributions are given in the fourth column of the revised table. The last column in Table I is the sum of the second and fourth columns. We now see less stability in the cutoff. This is mainly due to the subtraction terms we need to obtain the correct SU(3) flavor anomaly. The ENJL model we are using is expected to fail for scales around $\Lambda_\chi \simeq 1.5$ GeV, so we give as our final result for the hadronic light-by-light contribution to a_μ

$$a_\mu^{\text{light-by-light}} = -(11 \pm 5) \times 10^{-10}. \tag{1}$$

This is the result of adding to the number in the fourth column of Table I the $\mathcal{O}(N_c)$ scalar and axial-vector exchange contributions, the $\mathcal{O}(1)$ contribution from pseudoscalar meson loops, and the strange and charm quarks contributions. The error reflects the uncertainty from intermediate and high energy contributions. Further analysis of this theoretical error is necessary, and we shall come back to it elsewhere. This result is between 2σ and 3σ of the expected BNL uncertainty.

TABLE I. Results for the two dominant hadronic light-by-light contributions to a_μ in the ENJL model.

Cutoff (GeV)	$a_\mu \times 10^{10}$ from Constitutent quark in Fig. 2(a)	$a_\mu \times 10^{10}$ from Pseudoscalar exchange $\mathcal{O}(N_c)$ in Fig. 2(b)	$a_\mu \times 10^{10}$ from π^0, η, and η' exchanges $\mathcal{O}(N_c)$ + $U(1)_A$	$a_\mu \times 10^{10}$ Sum
0.7	1.14 ± 0.02	−19.4 ± 0.1	−7.2 ± 0.1	−6.1
1.0	1.44 ± 0.03	−24.2 ± 0.2	−9.4 ± 0.1	−8.0
2.0	1.78 ± 0.04	−33.0 ± 0.2	−13.2 ± 0.2	−11.4
4.0	1.98 ± 0.05	−39.6 ± 0.6	−15.9 ± 0.2	−13.9
8.0	2.00 ± 0.08	−46.3 ± 1.5	−18.6 ± 0.4	−16.6

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