Errata

Erratum: Magnetic-monopole solution of non-Abelian gauge theory in curved spacetime [Phys. Rev. D 11, 2692 (1975)]

F. A. Bais and R. J. Russell

The equations (2.10) should read

$$e^{-2\Lambda}[r^2W'' + 4rW' + 2W + (r^2W' + 2rW)(\phi' - \Lambda')] - 2W - 3er^2W^2 - er^2\varphi^2 - e^2r^4\varphi^2W - e^2r^4W^3 = 0\,,$$
$$e^{-2\Lambda}[r^2\varphi'' + 4r\varphi' + 2\varphi + (r^2\varphi' + r\varphi)(\phi' - \Lambda')] - 2\varphi(1 + er^2W)^2 + \tfrac{1}{2}\lambda r^2\varphi(F^2 - r^2\varphi^2) = 0\,. \qquad (2.10)$$

This makes the sentence following Eq. (5.1) inappropriate. The rest of the paper is unchanged.

Erratum: Calculation of asymptotic behavior of form factors in non-Abelian gauge theories [Phys. Rev. D 11, 2286 (1975)]

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The calculations in our paper of the off-shell asymptotic behavior of the form factor in non-Abelian gauge theories have been reexamined. We now find that, through sixth-order perturbation theory, in a leading logarithmic approximation, the form factor behaves as

$$F(q^2, p^2, p'^2) = 1 - Kx + \frac{1}{2!}(Kx)^2 - \frac{1}{3!}(Kx)^3 + \cdots\,.$$

K and x have been defined in our paper. This form suggests that in the region of approximation

$$F = e^{-Kx}\,.$$

This result is thus in agreement with that of J. Cornwall and G. Tiktopoulos [Phys. Rev. Lett. 35, 338 (1975) and UCLA report in preparation].

We have tracked down the sources of error in our previous calculation:

(a) The group-theoretic weight of diagram 10(d) should be $+\frac{1}{8}C_NC_A^2$ instead of $-\frac{1}{8}C_NC_A^2$.

(b) The weights of diagrams 12(a) and 12(b) should be $-\frac{1}{2}(C_NC_A^2 + F)$ and $-\frac{1}{2}F$, respectively.

We stress that the nature of our errors has been purely algebraic. The calculational techniques presented in our paper are correct. In particular, the method of Appendix B for computing the coefficient of diagram 12(a) *does give the correct weight.* The source of our error has been in not applying correctly the constraints of the relevant integration variables.

For reasons of completeness, and because we still feel that our methods are simpler than the standard ones, we would like to outline the calculation with some additional detail. Consider a general integral with four factors in the denominator, such as

$$J = \int \frac{d^4S}{(S - S_0)^2(S - S_1)^2(S - S_2)^2(S - S_3)^2}\,. \qquad (1)$$

By parametrizing only three of the factors, we get

$$J = 2\int dx_1dx_2dx_3\,\delta\left(1 - \sum_{i=1}^{3} x_i\right)\frac{d^4S}{(S + A)^2(S^2 + \Delta^2)^3}\,, \qquad (2)$$

where

$$A = \sum_{i=1}^{3} S_ix_i - S_0\,,$$

$$\Delta^2 = \sum_{i=1}^{3} S_i^2x_i - (A + S_0)^2\,.$$

By reparametrizing the remaining factors we obtain

$$J = \int dx_1dx_2dx_3\,\delta\left(1 - \sum_{i=1}^{3} x_i\right)\frac{1}{(\Delta^2)(A^2 + \Delta^2)}\,. \qquad (3)$$

Note that this result is exact.

For the case in question, we use

$$S_0 = r,\quad S_1 = k,\quad S_2 = -p',\ \text{and}\ S_3 = 0\,.$$

Then we have

$$\Delta^2 = (k+p')^2 x_1 x_2 + k^2 x_1 x_3 + p'^2 x_2 x_3$$

and

$$\Delta^2 + A^2 = r^2 x_3 + (k-r)^2 x_1 - (r+p')^2 x_2 \,.$$

The integral behaving as $1/r^2(k+p')^2$, which will yield the leading log contribution to (B3) of our paper, will be obtained when x_1 and x_2 approach zero and $x_3 \to 1$, subject to the *constraints*

$$x_1 > \frac{p'^2}{(k+p')^2}\,, \quad x_2 > \frac{k^2}{(k+p')^2}\,, \quad x_2 < \frac{r^2}{(r+p')^2}\,.$$

(This last constraint was not included in our previous analysis.) The subsequent straightforward integrations of (B3) indeed yield a result in agreement with that of Cornwall and Tiktopoulos. We have also checked this result by doing the calculation using the more conventional but long and tedious methods.

We would like to thank Dr. Cornwall and Dr. Tiktopoulos for pointing out where their calculation was in disagreement with ours.