*Erratum for the Book:*

# S. Pokorski, Gauge Field Theories

(2nd Edition)

Cambridge University Press

**Last update: March 25, 2008**

| **Place:** | **Instead of:** | **Should be:** |
|---|---|---|
| p.8, line 2 in eq. (0.9): | $= \sum_f \Psi^f Q \gamma^\mu \bar{\Psi}^f$ | $= \sum_f \bar{\Psi}^f Q \gamma^\mu \Psi^f$ |
| p. 17, line 2 in eq. (1.35): | $= \mathcal{L}\delta x^\mu + \frac{\partial \mathcal{L}}{\partial(\partial_\mu \Phi)} \delta_0 \Phi + \delta \Lambda^\mu + ...$ | $= \partial_\mu [\mathcal{L}\delta x^\mu + \frac{\partial \mathcal{L}}{\partial(\partial_\mu \Phi)} \delta_0 \Phi + \delta \Lambda^\mu] + ...]$ |
| p. 69, last line: | $+\frac{2}{3} A_\sigma A_\mu A_\nu$ | $-\frac{2}{3} A_\sigma A_\mu A_\nu$ |
| p. 85, eq. (2.56a) and next eq. | $-\mathrm{i}\delta(x-y)$ | $-\mathrm{i}\hbar\delta(x-y)$ |
| p. 109, lines below eq. (2.153): | It can be proved, for example, by induction, that ... | It can be proved that ... |
| line 1 below eq. (2.154): | The effective action ... | An easy way to prove eq. (2.154) is to consider the relation between the functionals $W[J]$ and $W'[J]$ for the fields $\Phi$ and $\bar{\Phi}$, respectively, and similarly $Z[J]$ and $Z'[J]$ †. The effective action ...<br>† I thank Yukinao Akamatsu, University of Tokyo, for pointing it to me. |
| p. 110, 2 lines above eq. (2.156): | Also, we can prove, for example, by induction, that ... | Similarly to eq. (2.154) one can prove that ... |
| p. 111, line 3 from the bottom: | (2.155) and (2.156) | (2.163) and (2.164) |
| p. 113, eq. (2.168) | $h_I(t) = ...$ | $H_I(t) = ...$ |
| p. 133, eq. (3.38): | $gc^{\alpha\beta\gamma} A^\mu_\gamma(x)\partial_\mu)...(D_\mu \partial^\mu)^{\alpha\beta}...$ | $gc^{\alpha\beta\gamma} \partial^{(x)}_\mu A^\mu_\gamma(x))...(\partial_\mu D^\mu)^{\alpha\beta}...$ |

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| p. 135, | | |
| line 2 in eq. (3.46): | $A^\mu_\gamma(x)\partial_\mu]...$ | $\partial_\mu A^\mu_\gamma(x)]...$ |
| line 2 in eq. (3.48): | $gc_{\alpha\beta\gamma}A^\gamma_\mu\eta^{*\alpha}(\partial^\mu\eta^\beta)]$ | $gc_{\alpha\beta\gamma}(A^\gamma_\mu\eta^{*\alpha}(\partial^\mu\eta^\beta)+(\partial^\mu A^\gamma_\mu)\eta^{*\alpha}\eta^\beta)]$ |
| p. 144, | | |
| line 2 from the bottom: | $=(M\eta)^\alpha$ | $=\frac{1}{\alpha}(M\eta)^\alpha$ |
| p. 148, | | |
| line 6 from the bottom: | mess | mass |
| p. 149, | | |
| line 2 in eq. (4.3): | $(y_0-x_0)$ | $\Theta(y_0-x_0)$ |
| line 5 in eq. (4.3): | $\frac{\mathrm{i}}{k_2-m_F^2+\mathrm{i}\varepsilon}$ | $\frac{\mathrm{i}}{k^2-m_F^2+\mathrm{i}\varepsilon}$ |
| p. 168, | | |
| eq. (4.50): | $dx\int[...]$ | $dx[...]$ |
| eq. (4.53): | $\frac{3}{16\pi^2\varepsilon}\frac{1}{\varepsilon}$ | $\frac{3}{16\pi^2}\frac{1}{\varepsilon}$ |
| p. 169, | | |
| line 2 in eq. (4.55): | $=I'_n+\frac{1}{2}(n-2)I_n$ | $=-\frac{1}{2}I'_n-\frac{1}{2}(n-6)I_n$ |
| line 6 from the bottom: | $1<n<5$ | $1<n<6$ |
| p. 170, | | |
| line 2 in eq. (4.59): | $\frac{\lambda}{16\pi^2}=\frac{1}{\varepsilon}$ | $=\frac{\lambda}{16\pi^2}\frac{1}{\varepsilon}$ |
| p. 171, | | |
| last eq.: | $+\frac{1}{\varepsilon^2}[...]$ | $+\frac{1}{\varepsilon}[...]$ |
| p. 177, | | |
| eq. (5.1): | $-\frac{1}{4}F^B_{\mu\nu}+F^{\mu\nu}_B+...$ | $-\frac{1}{4}F^B_{\mu\nu}F^{\mu\nu}_B+...$ |
| p. 180, | | |
| line 2 in eq. (5.12): | $\alpha=\frac{\delta\Gamma}{\delta\bar{\Psi}}$ | $\alpha=-\frac{\delta\Gamma}{\delta\bar{\Psi}}$ |
| p. 181, | | |
| eq. above (5.18): | $=-\frac{\delta}{\delta\alpha(z)}\frac{\delta}{\delta\bar{\alpha}(z)}$ | $=-\frac{\delta}{\delta\alpha(z)}\frac{\delta}{\delta\bar{\alpha}(x)}$ |
| line 2 in eq. (5.18): | $+iq\bar{e}\frac{\delta^2}{\delta\bar{\alpha}(x)\delta\alpha(y)}\delta(y-x)$ | $+iq\bar{e}\frac{\delta^2}{\delta\bar{\alpha}(x)\delta\alpha(y)}\delta(y-z)$ |
| p. 185, | | |
| line 1 below eq. (5.26): | ... reads | ... reads (see p. 266 for the discussion of the running $\alpha(q^2)$) |
| p. 188, | | |
| eq. (5.47): | $\frac{1}{(p+k)^2m^2}$ | $\frac{1}{(p+k)^2-m^2}$ |
| p. 189, | | |
| line 1 in eq. (5.49): | $=\frac{2\alpha}{\pi}\frac{1}{\epsilon}$ | $=-\frac{2\alpha}{\pi}\frac{1}{\epsilon}$ |
| line 2 in eq. (5.49): | $(Z_0-1)^{(1)}=...$ | $(Z_2-1)^{(1)}=...$ |

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|---|---|---|
| p.191, eq. (5.61): | $...\frac{1}{k^2}(Z_1-1)^{(1)}\gamma_\mu$ | $...\frac{1}{k^2}+(Z_1-1)^{(1)}\gamma_\mu$ |
| p. 193, eq. (5.68): | $\bar{u}(p')\gamma_\mu u(p)-...$ | $\bar{u}(p')\gamma^\mu u(p)+...$ |
| eq. (5.70): | $F_2(q^2)...$ | $F_2(q^2)=...$ |
| p. 199, line 7 from the bottom: | $[\Gamma(1+\frac{1}{2}\varepsilon)\Gamma(\frac{1}{2}\varepsilon)/\Gamma(1+\frac{1}{2}\varepsilon)$ $-\Gamma^2(1+\frac{1}{2}\varepsilon)/\Gamma(2+\varepsilon)]$ | $[\Gamma(1+\frac{1}{2}\varepsilon)\Gamma(\frac{1}{2}\varepsilon)/\Gamma(1+\varepsilon)$ $-2\Gamma^2(1+\frac{1}{2}\varepsilon)/\Gamma(2+\varepsilon)]$ |
| p. 200, line below eq. (5.100): | $Ze^2$ | $Ze$ |
| next formula: | $...\frac{1}{2\lvert\mathbf{p}\rvert}$ | $...=\frac{1}{2\lvert\mathbf{p}\rvert}$ |
| p. 201, line below eq. (5.102): | $=2\lvert\mathbf{p}\rvert^2\cos\theta$ | $=\lvert\mathbf{p}\rvert^2\cos\theta$ |
| p. 202, eq. (5.108): | $\frac{d^3\mathbf{p}'}{(2\pi)^3}$ | $\frac{d^3\mathbf{p}'}{2p_0'(2\pi)^3}$ |
| p. 211, eq. (6.6): | $Z_3^3Z_1^{-1}$ | $\ln(Z_3^2Z_1^{-1})$ |
| p. 212, line 2 in eq. (6.11): | $\int_0^1...$ | $\int_0^t...$ |
| p. 213, eq. (6.16): | $\int_0^1...$ | $\int_0^t...$ |
| p. 214, line 2 below eq. (6.20): | the 1PI Green's function $\Gamma^{(n)}$ by ... | the 1PI Green's function $\Gamma^{(n)}$ (in a complete discussion one should include 1P reducible Green's functions as well; such an extension is straightforward) by ... |
| p. 216, line 2 in eq. (6.28): | $\gamma_m(\alpha,a)=\lim_{\varepsilon\to 0}...$ | $\gamma_m(\alpha,a)=-\lim_{\varepsilon\to 0}...$ |
| lines below eq. (6.28): | $m_B=Z_m^{-1}m,...\alpha=Z_3^{-1}a_B$ | $m_B=Z_mm,...a=Z_3^{-1}a_B$ |
| p. 218, eq. (6.38) for $Z_0$: | $-\frac{\lambda^2}{2(16\pi^2)\varepsilon}$ | $-\frac{\lambda^2}{2(16\pi^2)^2\varepsilon}$ |
| eq. (6.38) for $Z_3$: | $-\frac{\lambda^2}{12(16\pi^2)\varepsilon}$ | $-\frac{\lambda^2}{12(16\pi^2)^2\varepsilon}$ |
| last equation: | $b_2+...$ | $\frac{b_2}{2\varepsilon}+...$ |
| p. 225, eq. (6.61) and above it: | $b_0...b_1$ | $\beta_0...\beta_1$ |

| **Place:** | **Instead of:** | **Should be:** |
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| p. 245, line 2 in eq. (7.60): | $= -\frac{i}{4\pi^2}...$ | $= +\frac{i}{4\pi^2}...$ |
| p. 291, line 2 in eq. (8.69): | $P = (zP + (p_\perp^2 + p_\perp^2)...$ | $p = (zP + (p_\perp^2 + p^2)...$ |
| p. 319, line 3 in eq. (9.9): | $Q^b_R$ | $Q^b_{R,L}$ |
| p. 324, line in eq. (9.26): | $-\frac{1}{4}\gamma...$ | $-\frac{1}{4}\lambda...$ |
| p. 339, eq. (9.87): | $= v_3\sigma^3$ | $+v_3\sigma^3$ |
| p. 345, line 1 above eq. (10.13): | defined as ... | are defined as ... |
| line 1 in eq. (10.13): | $+\partial_\mu\Theta^a(x) + ...$ | $-\partial_\mu\Theta^a(x) + ...$ |
| p. 346, eq. (10.15): | $+c^{abc}...$ | $-c^{abc}...$ |
| p. 362, line 1 above eq. (10.80) and in eq. (10.80): | $Tj_\mu(x)j^\mu(x)$ | $Tj_\mu(x)j^\mu(0)$ |
| p. 398, line 1 in eq. (12.34): | $M^{ab}_{LL}(x,y)\eta^a_L(y)$ | $M^{ab}_{LL}(x,y)\eta^b_L(y)$ |
| p. 400, line 4 from the top: | $M^{BA}\nu^{cA}_L\nu^{cB}_L$ | $M^{AB}\nu^{cA}_L\nu^{cB}_L$ |
| eq. (12.41): | $\hat{Y}_\nu\hat{M}^{-1}\hat{Y}^T_\nu$ | $\hat{Y}^T_\nu\hat{M}^{-1}\hat{Y}_\nu$ |
| p. 411, line 2 from the bottom: | and process-dependent corrections consisting ... | and corrections, often called process-dependent, consisting ... |
| p. 412, starting at line 5 under Fig. 12.5: | the splitting into universal and process-dependent parts is gauge-dependent and to get physical ... | the splitting into universal and so-called process-dependent parts is gauge-dependent: the vertex and box corrections contain also contributions which are independent of the external legs and cancel the gauge dependence of the corrections to the gauge boson propagators. To get physical ... |

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| p. 412, line 13 under Fig. 12.5: | of at least part of the process-dependent corrections ... | of the external leg independent vertex corrections ... |
| line 1 in the footnote‡: | is cancelled by the vertex corrections. ... | is cancelled by the external leg independent part of vertex corrections. ... |
| p. 461, line 1 below eq. (13.9): | $p_\nu \varepsilon_{\nu\delta\alpha\beta} p^\alpha q^\beta$ | $p_\mu \varepsilon_{\nu\delta\alpha\beta} p^\alpha q^\beta$ |
| p. 541, eq. (A20): | $\bar{\chi}^{\dot{\alpha}} = \bar{\chi}_{\dot{\beta}} \varepsilon^{\dot{\beta}\dot{\alpha}}$ <br> $\bar{\chi}_{\dot{\alpha}} = \bar{\chi}^{\dot{\beta}} \varepsilon_{\dot{\beta}\dot{\alpha}}$ | $\bar{\chi}^{\dot{\alpha}} = \bar{\chi}_{\dot{\beta}} \varepsilon^{\dot{\alpha}\dot{\beta}}$ <br> $\bar{\chi}_{\dot{\alpha}} = \bar{\chi}^{\dot{\beta}} \varepsilon_{\dot{\alpha}\dot{\beta}}$ |
| p. 565, line 3 from the top: | $+is^2 c^2 M_Z^2 Z_H (1 - \frac{\delta v}{v})^2 (1 - Z_g Z_W^{-1})^2 g^{\mu\nu}$ | erase this line |
| p. 567, propagator of $\eta_+$: | $\eta_+ ... \eta_+$ | $\eta_\pm ... \eta_\pm$ |
| p. 579, vertex $G^\pm \eta_\mp \eta_\gamma$: | $-\mathrm{i}\xi M_W$ | erase this line |
| vertex $G^\pm \eta_Z \eta_\pm$: | $+\mathrm{i}\frac{e}{2s}$ | $+\mathrm{i}\frac{e}{2sc}(c^2 - s^2)\xi M_W$ |
| p. 581, line 19 from the bottom: | $\bar{\psi}'_j \Gamma \psi'_k$ | $\bar{\psi}_j \Gamma \psi_k$ |
| p.583, 584, eqs. (D.1), (D.8), (D.9): | $\frac{d^n k}{(4\pi)^n}$ | $\frac{d^n k}{(2\pi)^n}$ |