1 Statistical Approach to Quantum Field Theory: Corrections

1.1 Chapter 2

one line below (2.10): function → functions
eq. (2.14): $2m \to m$ in denominator:

$$\frac{\mathrm{d}\hat{q}^i}{\mathrm{d}t} = \frac{\hat{p}_i}{m} \quad \text{and} \quad \frac{\mathrm{d}\hat{p}_i}{\mathrm{d}t} = -\hat{V}_{,i} \ .$$

one line above section 2.4: reference → references
one line below (2.38): from → forms
4 lines below (2.50): in annihilated → is annihilated
one eq. above eq. (2.51), in first exponent: replace t by $t_1 - t_2$
eq. 2.85: q_{i_m} in denominator should be j_{i_m}
problem 2.5, very last equation: right hand side should read

$$\sqrt{\frac{m}{2\pi\beta}} \exp(..)$$

(square root sign is missing).

1.2 Chapter 3

1.3 Chapter 4

eq. (4.65): $p_{(N)}$ on the left $\to p_{(p)}$
Problem 4.2: The allowed transitions ..... mod 1 should read: The allowed transitions are $\omega \to \omega$ and $\omega \to (\omega + 1)$ mod 3.

1.4 Chapter 5

Around eq. (5.23): replace
For example, the operator

$$A = -\frac{\mathrm{d}^2}{\mathrm{d}\varphi^2} + 1 \quad \text{on} \quad L_2(S^1) \tag{1}$$

has double degenerate eigenvalues $1^2, 2^2, 3^2, 4^2, \ldots$ and its zeta-function is given by Riemann's celebrated zeta-function,

$$\zeta_R(A) = 2\sum_{n=1}^{\infty} \frac{1}{n^{2s}} = 2\zeta_R(2s) \ .$$

by:
For example, the operator

$$A = -\frac{\mathrm{d}^2}{\mathrm{d}\varphi^2} \quad \text{on} \quad [0, \pi]$$

with Dirichlet boundary conditions on both ends of the interval has the eigenvalues $1^2, 2^2, 3^2, 4^2, \ldots$ and its zeta-function is given by Riemann's celebrated zeta-function,

$$\zeta_R(A) = \sum_{n=1}^{\infty} \frac{1}{n^{2s}} = \zeta_R(2s) \ .$$

the last sum in eq. (5.72) goes from 1 to d and not from 1 to N.
above eq. (5.77):

replace
The value on the diagonal is given by
by
In one dimension the value on the diagonal is given by

Insert the following problem before Problem 5.4:
Calculate the Fourier integral (5.76) in one dimension to obtain the 2-point function

$$\langle \phi_x \phi_0 \rangle = \frac{1}{m\sqrt{m^2+4}} \exp\left(-2x \log\left[\frac{m}{2} + \sqrt{1+\frac{m^2}{4}} \right] \right)$$

and discuss the result for small m.
Hint: Assume a positive x and show that the integral over $[-\pi, \pi]$ can be replaced by the corresponding integral over the loop

$$-\pi \to \pi \to \pi + \mathrm{i}\infty \to -\pi + \mathrm{i}\infty \to -\pi \, .$$

Then convince yourself the the integrand has one pole in the region encircled by the loop.

eq. (5.92) should read

$$\int \mathrm{d}^d z \frac{\delta^2 W}{\delta j(x) \delta j(z)} \frac{\delta^2 \Gamma}{\delta \varphi(z) \delta \varphi(y)} = \delta(x, y) \, ,$$

1.5 Chapter 6

check term $-2K$ in eq. 6.3
One equation above eq. (6.44): A 1 is missing between the brackets on the left.

1.6 Chapter 7

eq. (7.24) and two lines after: T_c should read $T_{c,\mathrm{mf}}$
eq. (7.78): denominator wrong. Correct is r^{d-2}
eq. (7.101): in exponent replace u_{MF} by u_{mf}
eq. (7.114) replace $H = \ldots$ by $S = \ldots$

1.7 Chapter 7

6 lines above section (8.7):
. . . results (7.23) and (7.24). → . . . result (7.23).

1.8 Chapter 8

footnote page 155: a hermitan matrix ... too strong a condition, check

1.9 Chapter 9

4 lines after subsection (9.1.1): occupations numbers → occupation numbers
2 lines above eq. (9.8): intrinsic quantities → intensive quantities
eq. (9.36) should read

$$E(X) = E_0 + 2h\,|X| + 2J\,|\partial X| \, ,$$

eq. (9.37) should read

$$Z = \mathrm{e}^{-\beta E_0} \sum_X \mathrm{e}^{-2\beta h |X| - 2\beta J |\partial X|} \equiv \mathrm{e}^{-\beta E_0}\, \Xi \, ,$$

3 lines below eq. (9.46): approximately $-6.80717 \to$ approximately -6.58598
4 lines below eq. (9.46): $1/u_c \approx 5.837266 \to 1/u_c \approx 5.82541$
line 16 of subsection 9.3.2 and caption of figure 9.14: high-temperature $\to$ low-temperature

1.10 Chapter 10

line 4 in proof of Lemma 10.2: $\lambda_{\text{may}} \to \lambda_{\text{max}}$
2 lines above Lemma 10.3: non-intersection $\to$ non-intersecting
1 line above Lemma 10.3: of counters $\to$ of contours
one line above eq. 10.15: Now it easy $\to$ Now it is easy
one line above eq. 10.22: and takes the values $\to$ takes the values

1.11 Chapter 11

4 lines after system of equations (11.6): index or $R \to$ index of R
eq. 11.31: index j of last $\Phi_{\alpha j}$ should be raised

1.12 Chapter 12

eq. (12.12) $\theta(k^2 - p^2)$ in denominator should read $\theta(p^2 - k^2)$
line after eq. 12.32: the fluctuation $\to$ the fluctuations
in the system 12.49: the k^{d+2} on the right hand sides should read k^{d+1}
the right hand side of the first equation has the opposite sign
8 lines after eq. 12.59: $c_1^* - 0.186041 \to c_1^* = -0.186041$
eq. 12.67: first term should read $k\partial_k \nu_k(\chi)$, after that: $= d\nu_k$ should be a $+d\nu_k$
in listing 12.2: delete first 3 lines

1.13 Chapter 13

line after eq. 13.7: space-time independent $\to$ space-time dependent
line above eq. 13.13: to an adjoint $\to$ to the adjoint
eqs. 13.13, 13.25 and 13.27: $\Omega_x^{-1} \to \Omega^{-1}(x)$
eq. 13.27: a path ordering is missing in front of the exponential function
eq. 13.37, third term on the right hand side: $\phi_s \to \phi_x$
one line above eq. 13.47: of a Euclidean $\to$ of an Euclidean
eqs. 13.64, 13.65, 13.66, 13.67, 13.68 and 13.71 and one and three lines after eq. 13.68: $v(h)$ or $\nu(h)$ should read $w(h)$; $v'(h)$ or $\nu'(h)$ should read $w'(h)$
same in line above eq. 13.69
line after 13.70: $v = \log z \to w = \log z$
two lines above eq 13.113: $-\beta_T(\log Z)/V \to -T(\log Z)/V$
eq. 13.115 and 1, 2 and 4 lines below: $\Delta f \to \Delta F$
eq. 13.120: ∂ missing in first denominator

1.14 Chapter 14

eq. 14.2: $P_0(t)$ should red $P_0(x_1)$ and $P_1(x)$ should read $P_1(x_0)$
eq. 14.10: $Z_V(\beta)$ in first numerator should read $\log Z_V(\beta)$
eq. 14.15, last argument of log: $n^2 \to n_0^2$

1.15 Chapter 15

line above eq. 15.17: and defined $\rightarrow$ and is defined
line above (15.25): from $\rightarrow$ form
2 lines below eq. 15.33: function chancel $\rightarrow$ function cancel
Theorem 15.1: Nielsen-Nynomyia $\rightarrow$ Nielsen-Ninomiya
eq. 15.62 last term: $2d-1) \rightarrow (2d-1)r$
4 linese below eq. 15.62: center at $(0, m+rd) \rightarrow$ center at $(m+rd, 0)$
eq. above 15.63, later term: $(2d-1)/a \rightarrow (2d-1)r/a$
eq. 15.98: last $\mathcal{P}(\phi)$ should read $\mathcal{P}'(\phi)$
2 lines after eq. 15.100: $\Omega(x)$ should be Ω_x
eq. 15.106: last ϕ_q should read ϕ_p

1.16 Index

Effective action: 258 $\rightarrow$ 113,258
reference to SLAC missing