Errata: A Kinetic View of Statistical Physics

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Chapter 2:

1. Page 13: The line above Eq. (2.3) should read: "...that $P_N(x) = \Pi_N[r=(x+N)/2)]|dr/dx|$ becomes[2]". (Thanks to James Silva.)
   Then in Eq. (2.3), there should be a factor of $8Npq$ in the exponent, not $2Npq$, and a factor of 8π in the leading square root, not 2π. (Thanks to Tibor Antal and David Liu.)

2. Page 27. As written, Eq. (2.44) is appropriate for a discrete-time random walk. For a continuous-time random walk with a unit hopping rate between neighboring sites, which is what we actually consider, the factor $\delta(t)$ in Eq. (2.44) should be replaced by e^{-2dt}, the probability that there is no hopping by time t, where d is the spatial dimension. (Thanks to Tibor Antal.) The error in Eq. (2.44) propagates in a straightforward way throughout this section, as listed below:

   (a) The in-line equation just above (2.45) should be $P(\mathbf{r},s) = F(\mathbf{r},s)\,P(\mathbf{0},s) + \delta_{\mathbf{r},\mathbf{0}}/(s+2d)$, and Eq. (2.45) becomes

   $$F(\mathbf{r},s) = \frac{P(\mathbf{r},s) - \delta_{\mathbf{r},\mathbf{0}}/(s+2d)}{P(\mathbf{0},s)}\ .$$

   (b) For clarity, the un-numbered equation at the top of page 28 should be written as

   $$\mathcal{R} = F(\mathbf{0}, s=0) = \int_0^\infty F(\mathbf{0},t)\,dt\,.$$

   (c) Two lines above (2.49) should read "probability at the origin, in the limit $s \to 0$, is $P(s) \simeq 1/\sqrt{4s}$.", and Eq. (2.49) itself should be

   $$F(s) \simeq 1 - \sqrt{s}\,.$$

   (d) The last factor in the first un-numbered equation of page 29 should be $1/\sqrt{4s}$.

   (e) The line above (2.50) should be $t\,F(t) \simeq (4\pi t)^{-1/2}$, while Eq. (2.50) should be

   $$F(t) \simeq \frac{1}{\sqrt{4\pi}}\,\frac{1}{t^{3/2}} \quad \text{when} \quad t \to \infty.$$

   (f) In Eqs. (2.52), (2.53), and (2.54), there is no factor of 4.

(g) The un-numbered equation after (2.56) should be

$$F(s) \simeq [1-(6P(0))^{-1}] - \frac{\sqrt{s}}{24\pi P(0)^2} = \mathcal{R} - \frac{3(1-\mathcal{R})^2\sqrt{s}}{2\pi} \ .$$

In the following two sentences, the eventual return probability is $\mathcal{R} = [1-(6P(0))^{-1}]$ and the comparison should be made with Eq. (2.48). Finally Eq. (2.57) should be

$$F(t) \simeq \frac{3(1-\mathcal{R})^2}{4\pi^{3/2}} \frac{1}{t^{3/2}} \ .$$

3. Page 52, problem 2.3: The displayed equation should be replaced with

$$sP(n,s) - P(n,t=0) = P(n+1,s) + P(n-1,s) - 2P(n,s).$$

Furthermore, the correct expression for $P(n,s)$ is $P(n,s) = \lambda_-^{|n|}/(s+2-2\lambda_-)$. In this problem, it is implicitly assumed that the random walk starts at the origin.

4. Page 52, problem 2.6: The correct expression for the Laplace transform is

$$P_\pm(x,s) = \frac{1}{\sqrt{v^2+4Ds}}\, e^{\,\alpha_\mp\, x}.$$

5. Page 53, Problem 2.9: The constant C is missing the factor 2^μ. The correct expression is $C = -A\,\sqrt{\pi}\,\Gamma(-\mu/2)/\big[2^\mu\,\Gamma\big((1+\mu)/2\big)\big]$.

6. Page 56, problem 2.23, the boundary condition should read $c(r=a,t)=0$.
(Thanks to Colin Howard.)

Chapter 3:

1. Page 84, line 7: The sentence should read "Consequently, in the reference frame moving at the center of mass velocity, the particle velocities asymptotically decay as ..."

2. Equation (3.79): On the second line, the quantity T^{a_3/a_2} should be replaced with $\big(T/T(0)\big)^{a_3/a_2}$. Similarly, on the third line, the quantity T^{a_4/a_2} should be replaced with $\big(T/T(0)\big)^{a_4/a_2}$.

Chapter 4

1. Page 129, 2 lines above Eq. (4.61), the inequality should read $j \gg 1$.
(Thanks to Alexander Povolotsky.)

Chapter 5:

1. Page 166, footnote 17. The words "that is smaller" should be replaced by "not greater". Also in this footnote, the equation cited should be (5.102).

2. Page 169, problem 5.4. The second term on the right-hand side of the master equation should be $c_k(kM_0+1)$.
(Thanks to Ed Reznik.)

Chapter 6

1. Page 174, the second line after Eq. (6.2) should read: "... while the second term accounts for the creation of a fragment of size x due to the breakup of a larger cluster of size y. (Thanks to Alexander Povolotsky.)

2. Page 179, Eq. (6.21): Replace $M_k(s)$ with $c_k(s)$.

Chapter 7:

1. Page 205, paragraph 3 lines after Eq. (7.13): replace "'fragmentation' of an $(x+1)$-void by ..." with "'fragmentation' of an y-void, with $y \geq (x+1)$, by ...". (Thanks to Alexander Povolotsky.)

2. Page 223, two lines above Eq. (7.61). The equation reference should be to (7.60) not (7.61).

Chapter 8:

1. Page 240, 5 lines from the bottom and also the last line: replace Section 2.5 with Section 2.7. (Thanks to Alexander Povolotsky.)

2. Page 243, unnumbered equation below (8.23), second line should be

$$\frac{\sqrt{6}}{64\,\pi^3}\,\Gamma\left(\frac{1}{24}\right)\,\Gamma\left(\frac{5}{24}\right)\,\Gamma\left(\frac{7}{24}\right)\,\Gamma\left(\frac{11}{24}\right).$$

3. Page 251, Eq. (8.54). Here σ_m is the initial spin value at site m.

4. Page 252, 8 lines after Eq. (8.56) the text should read: "... satisfies a specified initial condition $G_k(t=0)$ and the...". Then in the first line of Eq. (8.57), $G_\ell(0)$ should be replaced by an arbitrary set of constants, say A_ℓ. Then in lines 2 and 3 of this equation $G_\ell(0)$ refers to the specified arbitrary initial condition.

5. Page 274, problem 8.3(c) should read: You may need to compute integrals of the form

$$\int_0^\infty e^{-x}\,[I_0(x) - I_1(x)]\,dx \qquad \text{and} \qquad \int_0^\infty e^{-2x}\,I_0(x)\,[I_0(x) - I_1(x)]\,dx\,.$$

   The three integrals given in the text are divergent, but their differences given above are convergent.

Chapter 9:

1. Page 317, first line. Replace "n exclusion points" with "n exclusion zones". (Thanks to Alexander Povolotsky.)

2. Page 321, problem 9.19(e). Replace "holes" with "islands".

Chapter 10:

1. Page 331. In a line above (10.20), replace $\psi(x)\left(\int_x^\infty \psi(y)\,dy\right)^2$ with $3\psi(x)\left(\int_x^\infty \psi(y)\,dy\right)^2$. In equation (10.20), erase the 1/3 factor on the right-hand side.

2. Page 341, long displayed equation inside the box: In the second line, the factor $\exp[N(F(x_0)]$ should be $\exp[NF(x_0)]$. In the third line, $\simeq$ should be $=$ and the factor $\exp[N|F(x_0)|]$ should be $\exp[NF(x_0)]$. (The absolute value is superfluous.)

3. Page 344, problem 10.2. For the uniform distribution, replace $\mathcal{E}_{\mathcal{M}} = -\frac{17}{36}$ with $\mathcal{E}_{\mathcal{M}} = -\frac{5}{12}$. For the exponential distribution, replace $\mathcal{E}_{\mathcal{M}} = -\frac{26}{27}$ with $\mathcal{E}_{\mathcal{M}} = -\frac{8}{9}$.

Chapter 12:

1. Page 385: The subsection title should be "Bimolecular reaction" not "Biomolecular reaction". (Thanks to Alexander Povolotsky.)

2. Page 393: The second term inside the first bracket on the right-hand side should be $\frac{2}{V}$. (Thanks to Naoki Masuda.)

3. Page 396, line 8: The reference should be to problem 2.20.

Chapter 14:

1. Page 453, Eq. (14.27). The correct form of the right-hand side of this equation is

$$\frac{N}{2} + \frac{1}{N-1}$$