

Physics of the Interstellar and Intergalactic Medium

Errata in the fourth and fifth printings.

Updated 2018.04.09

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Errata in the fourth and fifth printings.

- Plate 5 caption, typo:
...seen in Plate 6. → ...seen in Plate 4.
noted 2018.04.07 by L. Bouma.

- §3.6, p. 28, Eq. 3.31, typo: factor of 2 error. Eq. (3.31) should read

$$\sigma_{\mathrm{rr},u\ell}(E) = \frac{1}{2}\frac{g(X_\ell)}{g(X_u^+)}\frac{(I_{X,\ell u}+E)^2}{Em_ec^2}\sigma_{\mathrm{pi},\ell u}(h\nu = I_{X,\ell u}+E) \quad , \qquad (3.31)$$

noted 2015.06.01 by E. B. Jenkins

- §3.7, p. 28, Eq. (3.33), typo: sign error. Change $e^{-I_n/kT} \rightarrow e^{I_n/kT}$.
noted 2017.02.09

- §13.1, pp. 128, eq. (13.1), (13.3), (13.4): for notational consistency with the rest of the chapter, change $\sigma_{\mathrm{pe}} \rightarrow \sigma_{\mathrm{pi}}$
noted 2018.01.07 by L. Bouma.

- §13.1, p. 130, second paragraph, typo:
...to $3\times10^{-10}\,\mathrm{s}^{-1}$ for Si → ...to $3\times10^{-9}\,\mathrm{s}^{-1}$ for Si
noted 2017.03.05

- §14.9, p. 159, typo: factor of 2 error. Eq. (14.41) should read

$$\sigma_{\mathrm{rr}}(E) = \frac{g_\ell}{2g_u}\frac{(I+E)^2}{Em_ec^2}\sigma_{\mathrm{pi}}(h\nu = I+E) \quad . \qquad (14.41)$$

noted 2015.06.01 by E. B. Jenkins.

- §14.9, p. 160, typo: factor of 2 error. Eq. (14.43) should read

$$\frac{\langle\sigma v\rangle_{\mathrm{rr}}}{\langle\sigma v\rangle_{\mathrm{ci}}} \approx 2\pi\alpha^3\frac{f_{\mathrm{pi}}}{C}\frac{I}{kT}e^{I/kT} \quad , \qquad (14.43)$$

noted 2015.06.01 by E. B. Jenkins.

- §14.9, p. 160, typo: factor of 2 error. Eq. (14.44) and following should read

$$\frac{I}{kT}e^{I/kT} = \frac{C}{2\pi f_{\mathrm{pi}}}\frac{1}{\alpha^3} \quad . \qquad (14.44)$$

If $C \approx 1$ and $f_{\mathrm{pi}} \approx 1$, this has solution $I/kT \approx 10.6$. ...
noted 2015.06.01 by E. B. Jenkins.

- §28.3, p. 328, 4th paragraph, typo: change distance from Θ_1Ori C to the Orion Bar ionization front: $\sim 7.8\times10^{18}\,\mathrm{cm} \;\rightarrow\; \sim 7.8\times10^{17}\,\mathrm{cm}$
  noted 2015.04.07

- §32.9, p. 368, just before eq. (32.11), typo: change
  $A_V/N_\mathrm{H} = 1.87\times10^{21}\,\mathrm{cm}^2 \;\rightarrow\; A_V/N_\mathrm{H} = 5.3\times10^{-22}\mathrm{mag\,cm}^2$.
  noted 2016.03.04 by Ilsang Yoon.

- §32.11, p. 372, prepenultimate paragraph: terminological correction. Change "core" to "clump" (three occurrences).
  noted 2015.04.16

- §36.2.3, p. 400, Eq. (36.10): v_x multiplying B_yB_x should be v_y, and v_x multiplying B_zB_x should be v_z.
  noted 2015.12.17 by J. Miralda-Escudé.
  The equation should read

$$\left\{\left[\frac{\rho v^2}{2}+\frac{\gamma p}{(\gamma-1)}\right]v_x+\frac{(B_y^2+B_z^2)}{4\pi}v_x-\frac{(B_xB_yv_y+B_xB_zv_z)}{4\pi}-\kappa\frac{dT}{dx}\right\}_1 =$$

$$\left\{\left[\frac{\rho v^2}{2}+\frac{\gamma p}{(\gamma-1)}\right]v_x+\frac{(B_y^2+B_z^2)}{4\pi}v_x-\frac{(B_xB_yv_y+B_xB_zv_z)}{4\pi}-\kappa\frac{dT}{dx}\right\}_2 . \quad (36.10)$$

- §37.1, p. 413, 2nd paragraph: Change
  Cases of astrophysical interest will normally have..
  →
  Many cases of astrophysical interest will have...
  noted 2018.04.09.

- §37.1, p. 413, typo just above Eq. (37.3):
  $Jh\nu/c = \rho_1u_1h\nu/\mu_ic \ll \rho_1(u_1^2+c_1^2+B_1^2/8\pi)$.
  →
  $Jh\nu/c = \rho_1u_1h\nu/\mu_ic \ll \rho_1(u_1^2+c_1^2)+B_1^2/8\pi$.
  noted 2016.12.08 by Ryohei Nakatani.

- §37.1, Eq. (37.8): The correction term for x_R is not accurate for magnetized I-fronts: change

$$x_\mathrm{R}\approx\frac{1}{2}+\frac{2c_1^2+v_{A1}^2}{16c_2^2} \quad\rightarrow\quad x_\mathrm{R}\approx\frac{1}{2}$$

  [see Kim & Kim (2014, ApJ 797:135) for better approximations.]
  noted 2018.02.19 by Woong-Tae Kim.

- §37.1 and §37.2, pp. 414-416: the mathematics is correct, but the "weak-type", and "strong-type" terminology was unfortunately inverted: all occurrences of "weak-type" should be changed to "strong-type", and vice-versa:

- §37.1.1, p. 414, first paragraph:
  ...are called **strong R-type**. Strong R-type solutions...
  →
  ...are called **weak R-type**. Weak R-type solutions...
- §37.1.1, p. 414, second paragraph:
  ...referred to as **weak R-type**,... → ...referred to as **strong R-type**,...
- §37.1.1, p. 414, second paragraph:
  Hence, only strong R-type I-fronts are physically relevant.
  →
  Hence, only weak R-type I-fronts are physically relevant.
- §37.1.2, p. 414, first paragraph:
  ...is termed **weak D-type**. → ...is termed **strong D-type**.
- §37.1.2, p. 414, second paragraph:
  ...is termed **strong D-type**. → ...is termed **weak D-type**.
- Fig. 37.1 and caption should be:

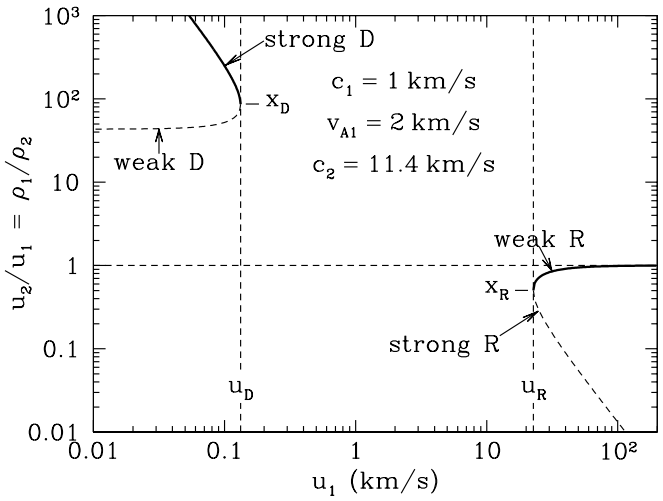

Figure 37.1 $u_2/u_1 = \rho_1/\rho_2$, as a function of the velocity u_1 of the I-front relative to the neutral gas just ahead of the I-front, for D-type and R-type ionization front solutions (see text) for an example with $c_1 = 1\,\mathrm{km\,s^{-1}}$, $v_{A1} = 2\,\mathrm{km\,s^{-1}}$, and $c_2 = 11.4\,\mathrm{km\,s^{-1}}$. The astrophysically relevant solutions are the strong D-type and weak R-type cases, shown as heavy curves. There are no solutions with u_1 between u_D and u_R.

- §37.1, p. 416, first paragraph:
  ...will be strong R-type, ... → ...will be weak R-type, ...
- §37.1, p. 417, fourth line:
  ...will now be weak D-type, ... → ...will now be strong D-type, ...
  noted 2016.12.06 by Ryohei Nakatani.

- §37.2, p. 418, typos:
  ...moving at a speed v_s that will be close to (just slightly larger than) the

speed of the I-front:

$$v_s \approx V_i \quad . \tag{37.21}$$

→
...moving at a speed V_s that will be close to (just slightly larger than) the speed of the I-front:

$$V_s \approx V_i \quad . \tag{37.21}$$

noted 2016.12.08 by Ryohei Nakatani.

- §38.3, p. 428, last paragraph, typo:
$\dot{M}_w \approx 2\times10^{-5}\,\mathrm{km\,s^{-1}} \rightarrow \dot{M}_w \approx 2\times10^{-5}\,M_\odot\,\mathrm{yr}^{-1}$
noted 2015.12.17 by J. Miralda-Escudé.

- §41.3, p. 456, typo: missing factor of G. Eq. (41.36) should read

$$E_{\rm grav} = -\frac{G}{2}\int dV_1 \int dV_2 \frac{\rho(\mathbf{r}_1)\rho(\mathbf{r}_2)}{|\mathbf{r}_1-\mathbf{r}_2|} \tag{41.36}$$

noted 2015.04.30 by J. Greco.

- Appendix D, p. 481: corrected typos:
F VI → VII: $I = 147.163 \rightarrow 157.163$
Ne VI → VII: $I = 154.214 \rightarrow 157.934$
Ti III → IV: $I = 24.492 \rightarrow 27.492$
Ti V → VI: $I = 123.7 \rightarrow 99.299$
Zn VI → VII: $I = 133.903 \rightarrow 108.0$
noted 2015.07.10 by Guangtun Ben Zhu.

- Appendix F, Table F.2, p. 497, typo: the first transition listed for S III: change
^{3}P$_0$–^{1}P$_0$ → ^{3}P$_0$–^{3}P$_1$
noted 2016.10.03 by C.D. Kreisch.

- Appendix F, Table F.6, p. 501: The table title should be
"Rate Coefficients for ... Deexcitation..." rather than "... Excitation...".
noted 2015.07.03

- Appendix F, Table F.6, p. 501: the rates for entries 5 and 6 should be interchanged, so that entries 4-6 read

H	C I	^{3}P$_0$ – ^{3}P$_1$	$1.26\times10^{-10}T_2^{0.115+0.057\ln T_2}$	*b*
H	C I	^{3}P$_0$ – ^{3}P$_2$	$8.90\times10^{-11}T_2^{0.228+0.046\ln T_2}$	*b*
H	C I	^{3}P$_1$ – ^{3}P$_2$	$2.64\times10^{-10}T_2^{0.231+0.046\ln T_2}$	*b*

noted 2015.07.03 by Munan Gong.

- Appendix F, Table F.6, p. 501: the rates for entries 23-28 should be changed to

H$_2$(para)	O I	^{3}P$_2$ – ^{3}P$_1$	$1.49\times10^{-10}T_2^{0.369-0.026\ln T_2}$	*h*
H$_2$(ortho)	O I	^{3}P$_2$ – ^{3}P$_1$	$1.37\times10^{-10}T_2^{0.395-0.005\ln T_2}$	*h*

H_2(para)	O I	$^3P_2 - {}^3P_0$	$2.37\times10^{-10}T_2^{0.255+0.016\ln T_2}$	*h*
H_2(ortho)	O I	$^3P_2 - {}^3P_0$	$2.23\times10^{-10}T_2^{0.284+0.035\ln T_2}$	*h*
H_2(para)	O I	$^3P_1 - {}^3P_0$	$2.10\times10^{-12}T_2^{1.117+0.070\ln T_2}$	*h*
H_2(ortho)	O I	$^3P_1 - {}^3P_0$	$3.00\times10^{-12}T_2^{0.792+0.188\ln T_2}$	*h*

noted 2015.08.24 by E.B. Jenkins.

- Appendix J, p. 510, Eq. (J.13), typo:

$$\Pi_0 \equiv \oint d\mathbf{S}\cdot\mathbf{r}p \quad \rightarrow \quad \Pi_0 \equiv \frac{1}{3}\oint d\mathbf{S}\cdot\mathbf{r}p$$

noted 2017.03.08.