1 Known Errors in *The Theory of Scintillation...* by C. L. Rino

As of **August 20, 2013**

1.1 Chapter 2

Errors:
P. 23 *Wyle* should be *Weil*
P. 28 Equation (2.26) should be

$$n\varkappa + \frac{dn}{ds}\mathbf{s} = \nabla n$$

1.2 Chapter 3

Errors:
P. 51 Equation (3.7) should be

$$\begin{aligned} \delta n_p &= -2\pi r_e \delta N_e c^2/\omega^2 \\ &= -2\pi r_e \delta N_e / k^2 \end{aligned}$$

P. 63 The following definitions should have been included:

$$\begin{aligned} R_{\delta\overline{n}}\left(\Delta\boldsymbol{\zeta}\right) &= \int_{-\infty}^{\infty} R_{\delta n}\left(\eta, \Delta\boldsymbol{\zeta}\right) d\eta \quad \text{units} \sim l \\ D_{\delta\overline{n}}\left(\Delta\boldsymbol{\zeta}\right) &= 2\left(R_{\delta\overline{n}}\left(0\right) - R_{\delta\overline{n}}\left(\Delta\boldsymbol{\zeta}\right)\right) \quad \text{units} \sim l \\ D_{\delta\overline{\phi}}\left(\Delta\boldsymbol{\zeta}\right) &= k^2 D_{\delta\overline{n}}\left(\Delta\boldsymbol{\zeta}\right) \quad \text{units} \sim 1/l \end{aligned}$$

P. 66 Equation (3.64) should be

$$\frac{\partial\Gamma_{22}(x,\boldsymbol{\zeta}_1,\boldsymbol{\zeta}_2;\boldsymbol{\xi}_1,\boldsymbol{\xi}_2)}{\partial x} = -\frac{i}{2k}\left[\nabla^2_{\boldsymbol{\zeta}_1} + \nabla^2_{\boldsymbol{\zeta}_2} - \nabla^2_{\boldsymbol{\xi}_1} - \nabla^2_{\boldsymbol{\xi}_1}\right]\Gamma_{2,2}(x,\cdots)$$
$$-\frac{k^2}{2}\left[D_{\delta\overline{n}}(\boldsymbol{\zeta}_1 - \boldsymbol{\xi}_2) + D_{\delta\overline{n}}(\boldsymbol{\zeta}_2 - \boldsymbol{\xi}_1) + D_{\delta\overline{n}}(\boldsymbol{\zeta}_2 - \boldsymbol{\xi}_2) + \right.$$
$$\left. D_{\delta\overline{n}}(\boldsymbol{\zeta}_1 - \boldsymbol{\xi}_1) - D_{\delta\overline{n}}(\boldsymbol{\zeta}_1 - \boldsymbol{\zeta}_2) - D_{\delta\overline{n}}(\boldsymbol{\xi}_1 - \boldsymbol{\xi}_2)\right]\Gamma_{2,2}(x,\cdots)$$

P. 66 Equation (3.69) should be

$$\frac{\partial\Gamma_{22}(x,\boldsymbol{\alpha}_0,\boldsymbol{\alpha};\boldsymbol{\alpha}_1,\boldsymbol{\alpha}_2)}{\partial x} = \frac{i}{k}\left[\nabla_{\alpha_0}\cdot\nabla_{\alpha} - \nabla_{\alpha_1}\cdot\nabla_{\alpha_2}\right]\Gamma_{22}(x,\cdots) +$$
$$\frac{k^2}{2}\left[D_{\delta\overline{n}}(\boldsymbol{\alpha}_1 + \boldsymbol{\alpha}/2) + D_{\delta\overline{n}}(\boldsymbol{\alpha}_1 - \boldsymbol{\alpha}/2) + D_{\delta\overline{n}}(\boldsymbol{\alpha}_2 - \boldsymbol{\alpha}/2) + \right.$$
$$\left. D_{\delta\overline{n}}(\boldsymbol{\alpha}_2 + \boldsymbol{\alpha}/2) - D_{\delta\overline{n}}(\boldsymbol{\alpha}_1 + \boldsymbol{\alpha}_2) - D_{\delta\overline{n}}(\boldsymbol{\alpha}_1 - \boldsymbol{\alpha}_2)\right]\Gamma_{22}(x,\cdots).$$

P.67 Equation (3.70) should be

$$\frac{\partial\Gamma_{22}(x,\boldsymbol{\alpha}_1,\boldsymbol{\alpha}_2)}{\partial x} = -\frac{i}{k}\nabla_{\alpha_1}\cdot\nabla_{\alpha_2}\Gamma_{22}(x,\boldsymbol{\alpha}_1,\boldsymbol{\alpha}_2) -$$
$$\frac{k^2}{2}\left[2D_{\delta\overline{n}}(\boldsymbol{\alpha}_1)+2D_{\delta\overline{n}}(\boldsymbol{\alpha}_2)-\right.$$
$$\left.D_{\delta\overline{n}}(\boldsymbol{\alpha}_2+\boldsymbol{\alpha}_2)-D_{\delta\overline{n}}(\boldsymbol{\alpha}_1-\boldsymbol{\alpha}_2)\right]\Gamma_{22}(x,\boldsymbol{\alpha}_1,\boldsymbol{\alpha}_2)$$

P. 67 Equation (3.71) should be

$$\begin{aligned}\Gamma_{22}(x,\boldsymbol{\alpha}_1,\boldsymbol{\alpha}_2) &= \exp\left\{-xk^2\left[D_{\delta\overline{n}}(\boldsymbol{\alpha}_1)+D_{\delta\overline{n}}(\boldsymbol{\alpha}_2)\right.\right.\\ &\quad \left.-D_{\delta\overline{n}}(\boldsymbol{\alpha}_1+\boldsymbol{\alpha}_2)/2-D_{\delta\overline{n}}(\boldsymbol{\alpha}_1-\boldsymbol{\alpha}_2)/2\}\right]\end{aligned}$$

P. 68 Equation (3.79) should be

$$\begin{aligned}\Gamma_{22}(0,\boldsymbol{\alpha}_1,\boldsymbol{\alpha}_2) &= \exp\left\{-k^2 l_p\left[D_{\delta\overline{n}}(\boldsymbol{\alpha}_1)+D_{\delta\overline{n}}(\boldsymbol{\alpha}_2)\right.\right.\\ &\quad \left.\left.-D_{\delta\overline{n}}(\boldsymbol{\alpha}_1+\boldsymbol{\alpha}_2)/2-D_{\delta\overline{n}}(\boldsymbol{\alpha}_1-\boldsymbol{\alpha}_2)/2\right]\right\}\end{aligned}$$

P. 70 Equation (3.84) should be

$$\begin{aligned}g(\boldsymbol{\alpha},\boldsymbol{\kappa}x/k) =&8C_p{\rho_F}^{(2\nu-1)}\iint \varkappa^{-(2\nu+1)}\sin^2\left(\varkappa\cdot\boldsymbol{\alpha}/\left(2\rho_F\right)\right)\\ &\times\sin^2\left(\varkappa\cdot\boldsymbol{\kappa}\rho_F/2\right)\frac{d\varkappa}{(2\pi)^2}\end{aligned}$$

P.72 Equation (3.89) should be

$$h\left(\boldsymbol{\eta},\boldsymbol{\mu}\right) = 2\left|\boldsymbol{\eta}\right|^{2\nu-1}+2\left|\boldsymbol{\mu}\right|^{2\nu-1}-\left|\boldsymbol{\eta}+\boldsymbol{\mu}\right|^{2\nu-1}-\left|\boldsymbol{\eta}-\boldsymbol{\mu}\right|^{2\nu-1}\ \text{ for } \nu\neq 1.5$$

P.72 Equation (3.90) should be

$$C_p(\nu) = \frac{C_p\ \Gamma\left(1.5-\nu\right)}{\sqrt{\pi}\Gamma(0.5+\nu)\left(2\nu-1\right)2^{2\nu-1}}$$

P.73 Equation (3.100) should be

$$\lim_{U(\nu)\to\infty}\iint\Phi_I(\boldsymbol{\kappa})\frac{d\boldsymbol{\kappa}}{(2\pi)^2} = \frac{2\sqrt{2\nu-2}}{5-2\nu}\ \text{ for } 1.5<\nu<2.0.$$

References to Michael Berry on pages 81 and 96 should read Martin Berry.

1.3 Chapter 4

Errors:

P. 103 Equation (4.1) should be

$$\psi_{\mathbf{k}}\left(x,\boldsymbol{\rho}\right) = \psi\left(x,\boldsymbol{\varsigma}\right)\exp\left\{-i\mathbf{k}_T\cdot\boldsymbol{\varsigma}\right\}$$

P. 103 Equation (4.3) should be

$$\begin{aligned}\mathbf{k} &= k\left[\cos\theta,\sin\theta\cos\phi,\sin\theta\sin\phi\right] \\ &= \left[kg(\mathbf{k}),\mathbf{k}_T\right],\end{aligned}$$

P. 103 Equation (4.3) should be

$$\begin{aligned}\widehat{\mathbf{a}}_{k_T} &= \mathbf{k}_T/k_T \\ &= \left[\cos\phi,\sin\phi\right].\end{aligned}$$

P. 104 (4.5) should be

$$\begin{aligned}\psi_{\mathbf{k}}\left(x;\boldsymbol{\rho}\right) &= \iint \widehat{\psi}_k\left(x_0;\boldsymbol{\kappa}+\mathbf{k}_T\right)\exp\left\{i\left(kg\left(\boldsymbol{\kappa}+\mathbf{k}_T\right)-\tan\theta\widehat{\mathbf{a}}_{k_T}\cdot\boldsymbol{\kappa}\right)\left(x-x_0\right)\right\} \\ &\quad\times\exp\left\{i\boldsymbol{\rho}\cdot\boldsymbol{\kappa}\right\}\frac{d\boldsymbol{\kappa}}{\left(2\pi\right)^2}.\end{aligned}$$

P. 108 Before (4.27), the reference should be to Appendix A.3
P. 108 Equation (4.31) should be

$$\rho_F' = \sqrt{\frac{x\sec\theta}{k}}$$

P. 108 Equation (4.35) should be

$$C'' = \left(A'+C'+D'\right)/2$$

P. 108 Equation (4.36) should be

$$D' = \sqrt{\left(C'-A'\right)^2-B'^2}$$

P. 109 Second sentence in last paragraph of Section 4.2.2 should read
There is a $\sqrt{10}:1$ SI enhancement ...
P. 111 Equation (4.44) should be

$$D_{\delta\phi}(f(\Delta\boldsymbol{\rho}+\mathbf{v}_{\mathbf{k}}\Delta t)) = k^2\vartheta\left\langle\delta n^2\right\rangle l_p\sec\theta\varkappa\left(1-\Re(f(\Delta\boldsymbol{\rho}+\mathbf{v}_{\mathbf{k}}\Delta t))\right)$$

P. 112 Equation (4.52) should be

$$\varphi(f) = \int R_{\psi_{\mathbf{k}}}(\mathbf{v}_k\Delta t)\exp\left\{-2\pi if\Delta t\right\}d\Delta t$$

P. 112 Equation (4.54) should be

$$T = v_{\text{eff}}^{2\nu-1}\vartheta\sec\theta C_p\frac{\sqrt{\pi}\Gamma\left(\nu\right)}{\left(2\pi\right)^{2\nu+1}\Gamma\left(\nu+1/2\right)}$$

P. 122 Equation (4.73) should be

$$\left\langle \delta n^2 \right\rangle = r_e^2 \lambda^4 \left\langle \delta N_e^2 \right\rangle / \left(4\pi^2\right)$$

P. 122 Equation (4.75) should be

$$C_s = r_e^2 \lambda^4 \frac{2\pi^{1/2}\Gamma(\nu + 1/2)}{\Gamma(\nu - 1)} q_L^{2\nu-2} \left\langle \delta N_e^2 \right\rangle$$

1.4 Chapter 5

Errors:

P.169 Equation (5.58) should be

$$\phi\left(t\right) = -2\pi r\left(t\right)/\lambda - r_e \lambda \overline{TEC} + \phi_{scint}\left(t; \lambda_1, r\right)$$

P. 170 Equation (5.59) should be

$$\begin{aligned} \Delta\phi\left(t\right) &= \phi_{VHF}\left(t\right) - \left(\lambda_{UHF}/\lambda_{VHF}\right)\phi_{UHF}\left(t\right) \\ &= -r_e \lambda_{VHF}\left(1 - \left(\lambda_{UHF}/\lambda_{VHF}\right)^2\right)\overline{TEC} - \Delta\phi_{scint} \end{aligned}$$