

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

As of April 9, 2012

## 1.1 Chapter 2

Errors:

P. 23 *Wyle* should be *Weil*

## 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:

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

P. 66 Equation (3.64) should be

$$\begin{aligned}\frac{\partial \Gamma_{22}(x, \zeta_1, \zeta_2; \xi_1, \xi_2)}{\partial x} &= -\frac{i}{2k} \left[ \nabla_{\zeta_1}^2 + \nabla_{\zeta_2}^2 - \nabla_{\xi_1}^2 - \nabla_{\xi_2}^2 \right] \Gamma_{2,2}(x, \dots) \\ &- \frac{k^2}{2} [D_{\delta\bar{n}}(\zeta_1 - \xi_2) + D_{\delta\bar{n}}(\zeta_2 - \xi_1) + D_{\delta\bar{n}}(\zeta_2 - \xi_2) + \\ &D_{\delta\bar{n}}(\zeta_1 - \xi_1) - D_{\delta\bar{n}}(\zeta_1 - \zeta_2) - D_{\delta\bar{n}}(\xi_1 - \xi_2)] \Gamma_{2,2}(x, \dots)\end{aligned}$$

P. 66 Equation (3.69) should be

$$\begin{aligned}\frac{\partial \Gamma_{22}(x, \alpha_0, \alpha; \alpha_1, \alpha_2)}{\partial x} &= \frac{i}{k} [\nabla_{\alpha_0} \cdot \nabla_{\alpha} - \nabla_{\alpha_1} \cdot \nabla_{\alpha_2}] \Gamma_{22}(x, \dots) + \\ &\frac{k^2}{2} [D_{\delta\bar{n}}(\alpha_1 + \alpha/2) + D_{\delta\bar{n}}(\alpha_1 - \alpha/2) + D_{\delta\bar{n}}(\alpha_2 - \alpha/2) + \\ &D_{\delta\bar{n}}(\alpha_2 + \alpha/2) - D_{\delta\bar{n}}(\alpha_1 + \alpha_2) - D_{\delta\bar{n}}(\alpha_1 - \alpha_2)] \Gamma_{22}(x, \dots).\end{aligned}$$

P.67 Equation (3.70) should be

$$\begin{aligned}\frac{\partial \Gamma_{22}(x, \alpha_1, \alpha_2)}{\partial x} &= -\frac{i}{k} \nabla_{\alpha_1} \cdot \nabla_{\alpha_2} \Gamma_{22}(x, \alpha_1, \alpha_2) - \\ &\frac{k^2}{2} [2D_{\delta\bar{n}}(\alpha_1) + 2D_{\delta\bar{n}}(\alpha_2) - \\ &D_{\delta\bar{n}}(\alpha_2 + \alpha_2) - D_{\delta\bar{n}}(\alpha_1 - \alpha_2)] \Gamma_{22}(x, \alpha_1, \alpha_2)\end{aligned}$$

P. 67 Equation (3.71) should be

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

P. 68 Equation (3.79) should be

$$\Gamma_{22}(0, \boldsymbol{\alpha}_1, \boldsymbol{\alpha}_2) = \exp \left\{ -k^2 l_p [D_{\delta\bar{n}}(\boldsymbol{\alpha}_1) + D_{\delta\bar{n}}(\boldsymbol{\alpha}_2) - D_{\delta\bar{n}}(\boldsymbol{\alpha}_1 + \boldsymbol{\alpha}_2)/2 - D_{\delta\bar{n}}(\boldsymbol{\alpha}_1 - \boldsymbol{\alpha}_2)/2] \right\}$$

### 1.3 Chapter 4

Errors:

P. 103 Equation (4.1) should be

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

P. 103 Equation (4.3) should be

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

P. 103 Equation (4.3) should be

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

P. 104 (4.5) should be

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

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

$$C'' = (A' + C' + D')/2$$

P. 108 Equation (4.36) should be

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

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

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

P. 112 Equation (4.52) should be

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

P. 112 Equation (4.54) should be

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

P. 122 Equation (4.73) should be

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

P. 122 Equation (4.75) should be

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

## 1.4 Chapter 5

Errors:

P.169 Equation (5.58) should be

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

P. 170 Equation (5.59) should be

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