1.4b $N_{ph}^{2} = T\int d\omega \frac{d\mathcal{F}}{d\omega}\, T\int d\omega' \frac{d\mathcal{F}}{d\omega'}$

$$N_{ph}^{2} = T^{2}\left(\frac{\sqrt{2\pi}}{\sigma_\omega} N_e\right)\left(\frac{\sqrt{2\pi}\, N_e}{\sigma_{\omega'}}\right)$$

$$N_{ph}^{2} = T^{2}\left(\frac{2\pi\, N_e^{2}}{\sigma_\omega \sigma_{\omega'}}\right)$$

$$\langle N_{ph}^{2}\rangle \cdot \frac{1}{\sigma_\omega} = T^{2} \frac{2\pi N_e^{2}}{\sigma_\omega \sigma_{\omega'}} \cdot \frac{1}{\sigma_\omega}$$

$$\langle N_{ph}^{2}\rangle \cdot \frac{1}{\sigma_\omega} = \frac{T^{2}\, 2\pi\, N_e}{\sigma_\omega^{2}} \cdot \frac{1}{\sigma_{\omega'}}$$

$$\langle N_{ph}^{2}\rangle \cdot \frac{1}{\sigma_\omega} = \langle N_{ph}\rangle^{2} \cdot \frac{N_e}{\sigma_{\omega'}}$$

$$\langle N_{ph}^{2}\rangle = \langle N_{ph}\rangle^{2} \cdot N_e \frac{\sigma_\omega}{\sigma_{\omega'}}$$

Q.E.D.

$$\langle N_{ph}^{2}\rangle \approx \langle N_{ph}\rangle^{2} \left\langle 1 + \frac{1}{N_e^{2}} \sum_{j\neq k} e^{-\sigma_\omega^{2}(t_j - t_k)^{2}} \right\rangle$$

should be j, k?