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

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

$$N_{ph}^2 = \frac{T^2(2\pi)\, Ne^4}{\sigma_\omega \sigma_{\omega'}}$$

$$\langle N_{ph}^2\rangle = \frac{T^2(2\pi)\, Ne^3}{\sigma_\omega \sigma_{\omega'}}$$

$$\langle N_{ph}\rangle^2 = \frac{T^2(2\pi)\, Ne^2}{\sigma_\omega^2}$$

$$\langle N_{ph}^2\rangle = \langle N_{ph}\rangle^2 Ne$$

Q.E.D.

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