

Integration over the waveguide modes

$$\frac{d\Gamma}{dy}(\mathbf{r}, \omega) = \frac{2e^2}{\pi \hbar v^2} \int_0^\infty \frac{dk_x}{k_{\parallel}^2} \text{Re} \left\{ k_{z1} e^{2ik_{z1}z_e(\mathbf{r})} \left[\left(\frac{k_x v}{k_{z1} c} \right)^2 r_{123}^s(k_{\parallel}) - \frac{1}{\epsilon_1} r_{123}^p(k_{\parallel}) \right] \right\}, \text{ \#paper149 Eq. (25)}$$

$$r_{123}^\nu = r_{12}^\nu + \frac{t_{12}^\nu t_{21}^\nu r_{23}^\nu e^{2ik_{z2}h}}{1 - r_{21}^\nu r_{23}^\nu e^{2ik_{z2}h}},$$

