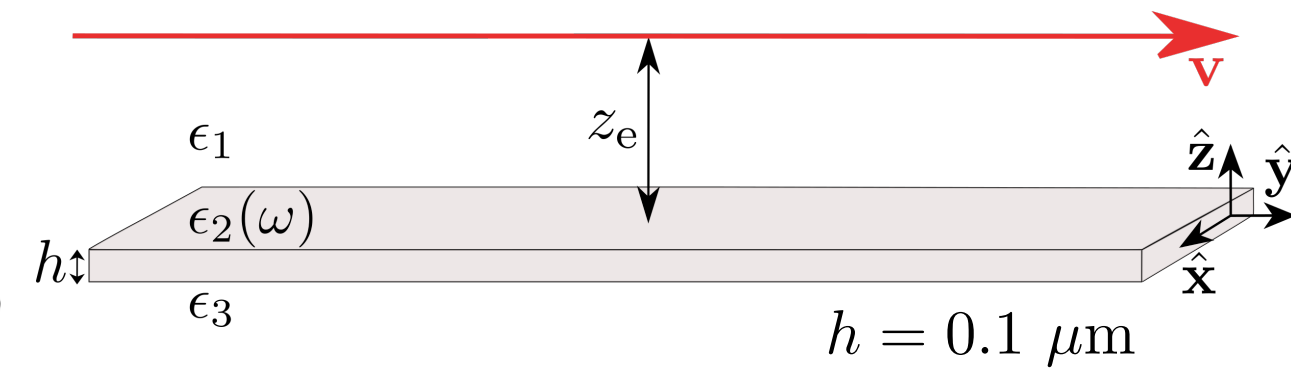


# Electron coupling to a waveguide mode

$$\frac{\Gamma_{\parallel}(\omega, k_{\parallel})}{L} = \frac{2e^2}{\pi \hbar v^2} \frac{k e^{-2k_{\parallel} z_e}}{\sqrt{k_{\parallel}^2 - \omega^2/v^2}} [\text{Im}\{r_{123}^s(k_{\parallel})\} + \text{Im}\{r_{123}^p(k_{\parallel})\}], \quad r_{123}^{\nu} = r_{12}^{\nu} + \frac{t_{12}^{\nu} t_{21}^{\nu} r_{23}^{\nu} e^{2ik_{z2}h}}{1 - r_{21}^{\nu} r_{23}^{\nu} e^{2ik_{z2}h}},$$



$\epsilon_2(\omega)$  Ge from Aspnes

