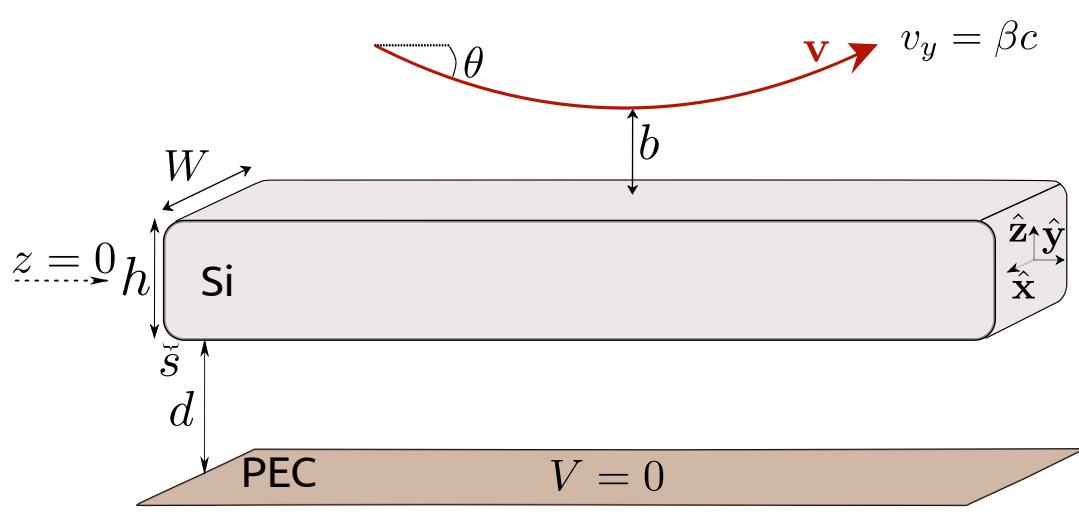


# Electron-coupling-to-waveguide

Correction of the trajectory and integration

$$\Gamma_{\text{EELS}}(\omega) = 2 \int_{z_{\min}}^{\infty} \frac{\beta dz}{\sqrt{\beta^2 \sin^2 \theta + \frac{2eV(z)}{m_e c^2 \gamma_e}}} \boxed{\frac{d\Gamma_{\text{EELS}}(\omega, z)}{dy}} \quad \text{from bem2D}$$

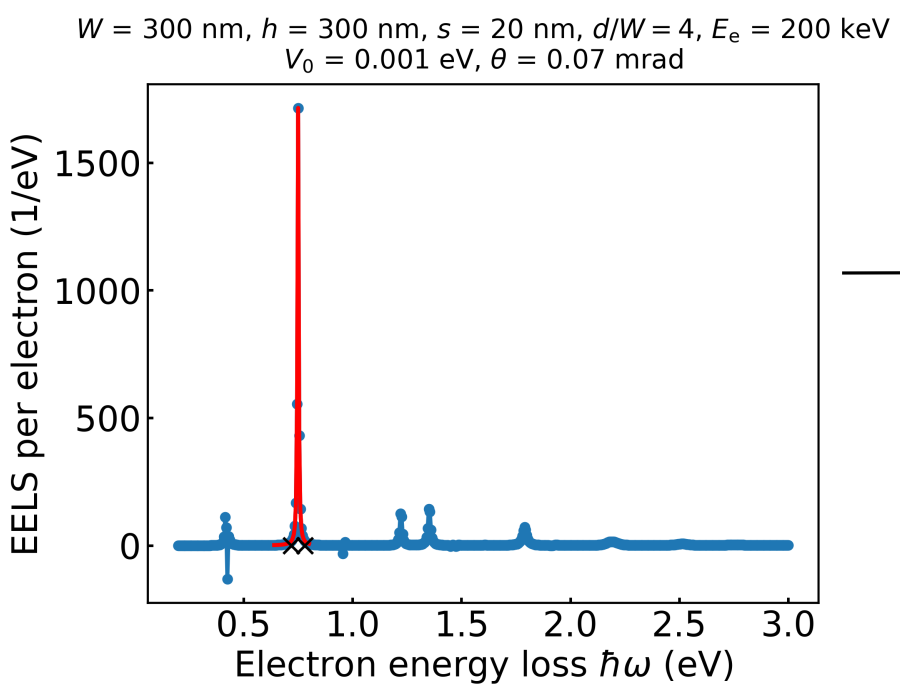
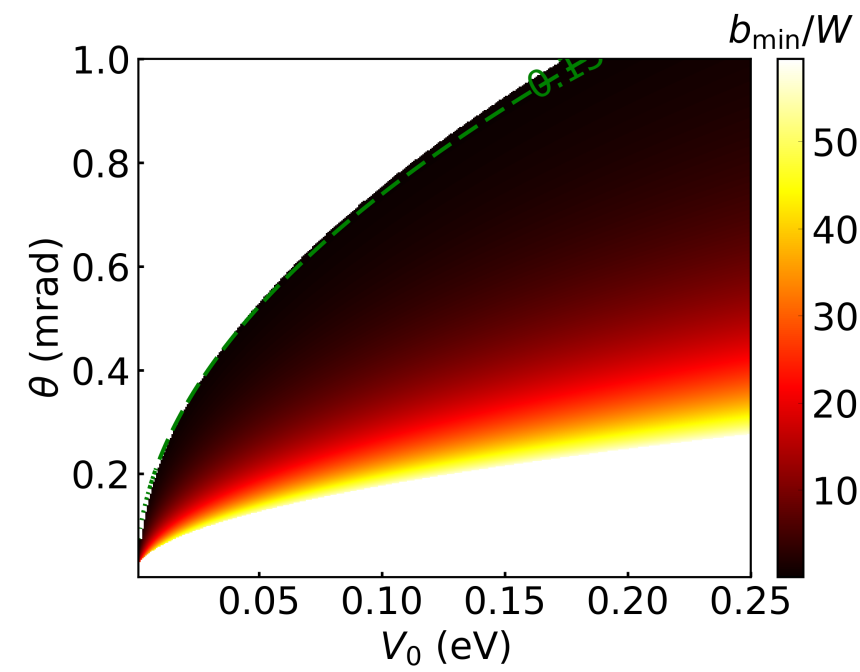
$d = 1200 \text{ nm}$



$E_e = 200 \text{ keV}$

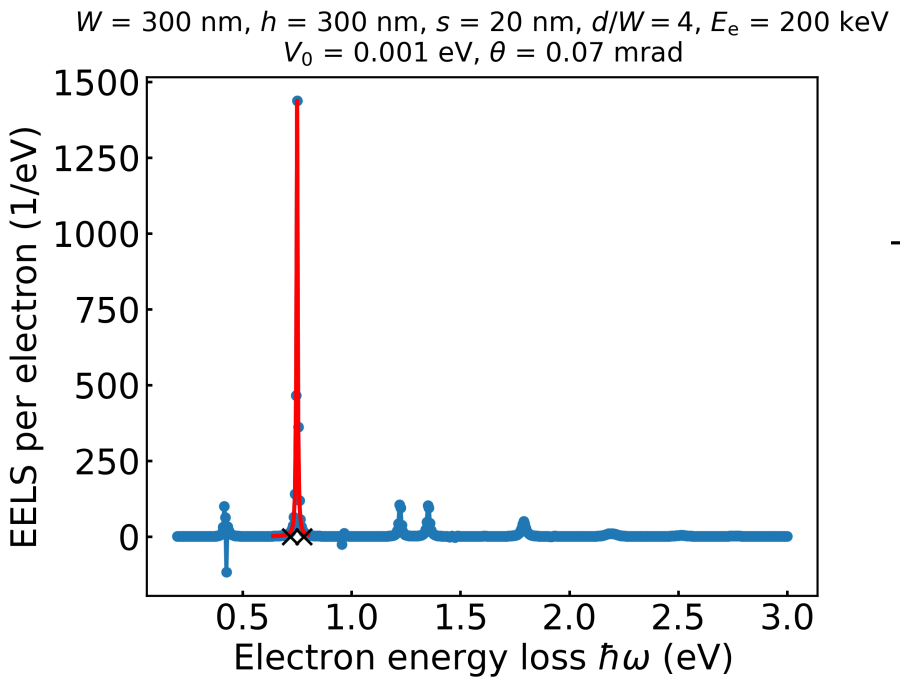
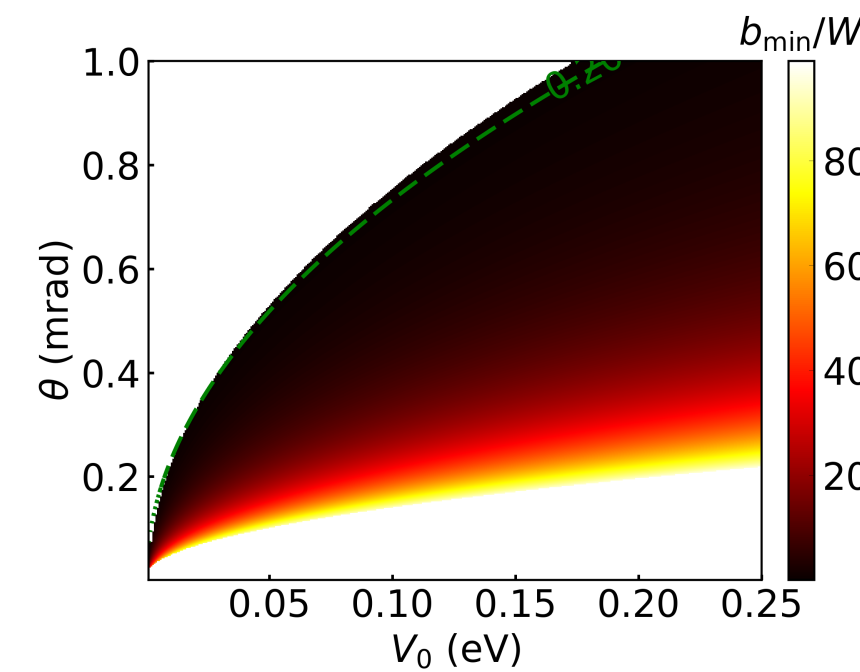
$$0 = \frac{V(z_{\min})}{V_0} + \frac{m_e c^2 \gamma_e}{2e} \frac{\beta^2 \sin^2 \theta}{V_0}$$

$b_{\min} = 45 \text{ nm}$



→ EELS integrated over mode (red) ~ 16

$b_{\min} = 60 \text{ nm}$



→ EELS integrated over mode (red) ~ 14  
(smaller area of integration over z)

All bmin converges  
for small V0 and theta