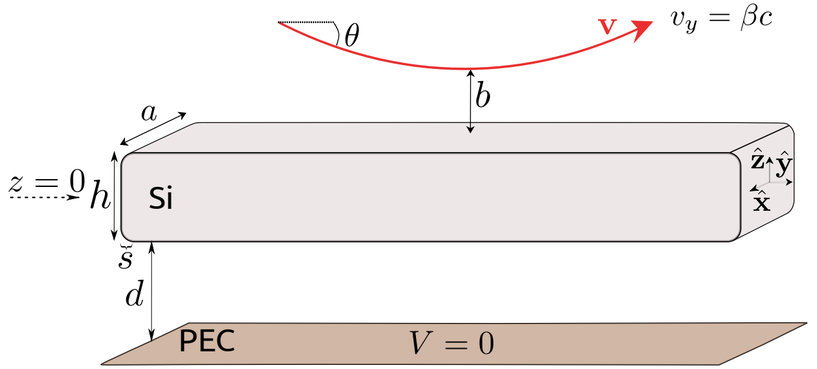
Electron-coupling-to-WG: Potential near rectangular nanowire

From motion equation: $\dfrac{\mathrm{d}z}{\mathrm{d}t} = \sqrt{\dfrac{2eV(z)}{m_\mathrm{e}\gamma_\mathrm{e}} + v_{\perp\infty}^2}$

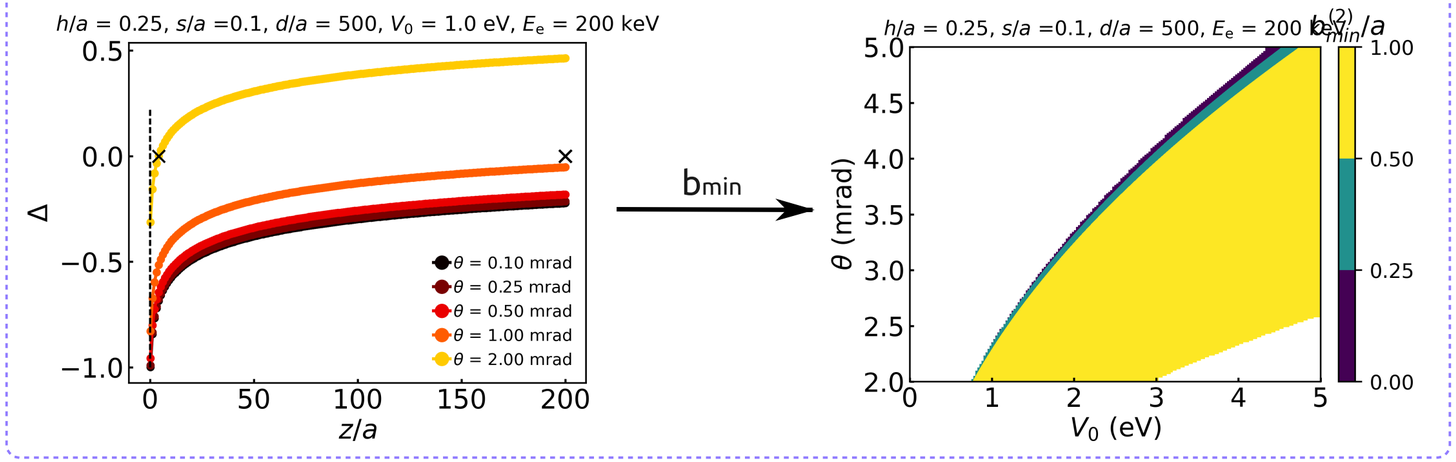
Minimum value of z: $\Delta = \dfrac{V(z)}{V_0} + \dfrac{m_\mathrm{e}c^2\gamma_\mathrm{e}}{2e}\dfrac{\beta^2\sin^2\theta}{V_0}$



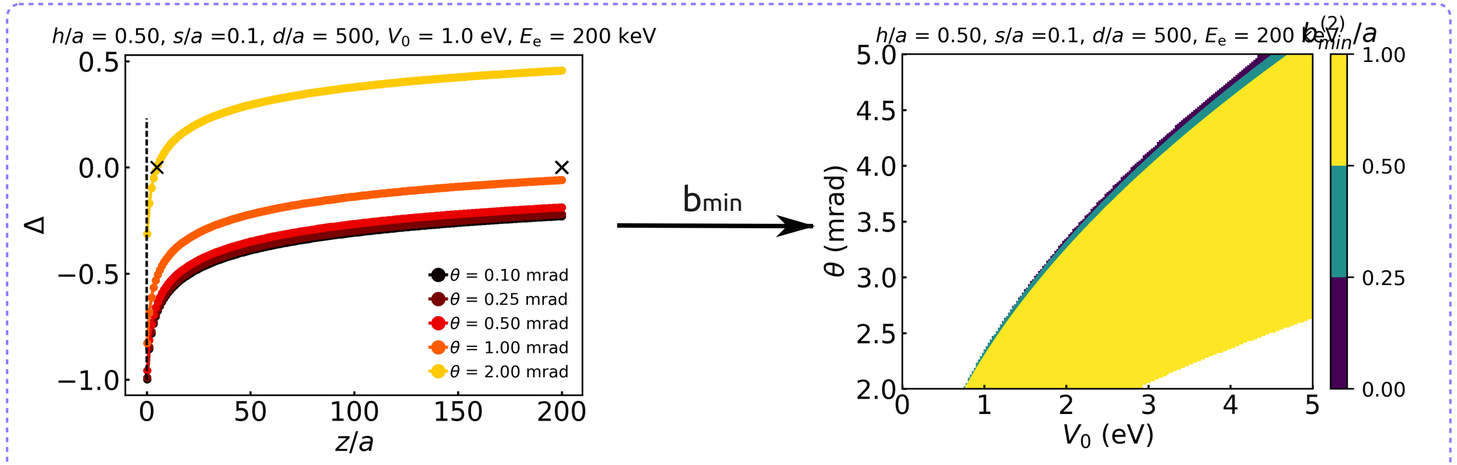
$d/a = 500 \quad s/a = 0.1$

$E_\mathrm{e} = 200\ \mathrm{keV}$

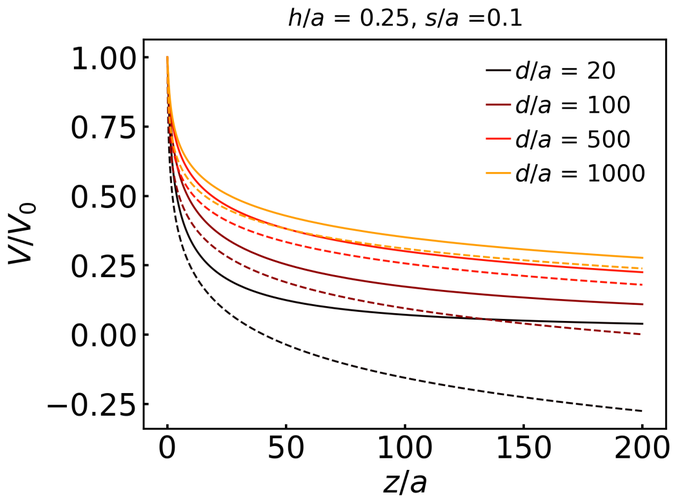
$h/a = 0.25$



$h/a = 0.5$



Potential: Numerical vs analytical (dashed)



V(z) decays slower for bigger d/a, then z_{min} is bigger
Increasing V0 to reduce V/V0 does not always work because the term sin(theta)/V0 also reduces
Bigger V0 requires a bigger angle