$$\frac{d}{dt} \qquad \phi_l(y) = \sqrt{\frac{2}{w}} \sin\left(\frac{\pi l y}{w}\right) \qquad \beta_l = \sqrt{k_c^2 - \frac{\pi^2 l^2}{w^2}}$$

$$\Psi = \sum_l I_l \phi_l(y) e^{i\beta_l x}$$

$$k_c^2 = \frac{2m_c(E - U_c)}{\hbar^2}$$

$$m_c$$

$$U_c$$