

$$\Psi(\mathbf{r}) = \Psi(z)\Psi(x, y) \quad (1)$$

$$E_{xy} = \frac{\hbar^2 \mathbf{k}_{xy}^2}{2m_e} \quad (2)$$

$$\Psi(z) = Ae^{ik_z z} + Be^{-ik_z z} \quad (3)$$

$$k_z d = n\pi \quad n = 1, 2, 3, \dots \quad (4)$$

$$E_z = \frac{\hbar^2 k_z^2}{2m_e} \quad (5)$$

$$2k_z d + \Phi_i + \Phi_v = 2\pi n \quad n = 1, 2, 3, \dots \quad (6)$$

$$E_{\min} = E_g + \frac{\hbar^2 \pi^2}{2\mu r^2} - \frac{1.8e^2}{4\pi\epsilon_0\epsilon r} \quad (7)$$

$$\psi_{\mathbf{k}}(\mathbf{r}) = e^{i\mathbf{k}\mathbf{r}} u_{\mathbf{k}}(\mathbf{r}) \quad (8)$$

$$\psi_{\mathbf{k}}(\mathbf{r}) = e^{\Im(k_z)z} e^{i\mathbf{k}'\cdot\mathbf{r}} u_{\mathbf{k}}(\mathbf{r}) \quad (9)$$

$$\psi_{\mathbf{k}_{||}}(\mathbf{r}) = e^{i\mathbf{k}_{||}\cdot\mathbf{r}_{||}} u_{\mathbf{k}_{||}}(\mathbf{r}_{||}) e^{i\kappa z} \quad (10)$$

$$\Delta E \approx VM B_{\text{inside}} \quad (11)$$

$$\Delta E \approx V\mu_0 M^2 \quad (12)$$