Dimensionless units

$\tilde{E} = E/E_0$, $\tilde{x} = x/x_0$

where

$E_0 = \hbar^2/(m x_0^2)$ unit of energy

x_0 unit of length

it is convenient to take box sizes as the unit of length $x_0 = L$

Iteration 0 (empty box)

1D) One dimensional box

$\psi_n(x) = \sin k_n x$, $n = 1, 2, 3 \ldots$

allowed momenta

$$k_n = n \cdot \frac{\pi}{L}$$

Energy $E = \frac{\hbar^2 k_n^2}{2m} = \frac{\pi^2 \hbar^2 n^2}{2mL^2}$

$$\tilde{E} = \frac{\pi^2 n^2}{2}$$

2D) Two dimensional box

$\psi(x,y) = \psi_{n_x}(x) \cdot \psi_{n_y}(y)$

Energy

$$E = \frac{\pi^2 \hbar^2}{2mL^2}\left(n_x^2 + n_y^2\right)$$

$$\tilde{E} = \frac{\pi^2}{2}\left(n_x^2 + n_y^2\right)$$

n_x	n_y	$\tilde{E}$
1	1	π^2
1	2	$\frac{5}{2}\pi^2$
2	1	