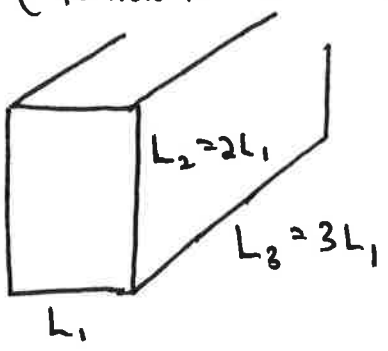
7-2 (Particle in 3-D box)




What are the quantum #s of the lowest 10 energy levels for an electron in this box?

$$E_{n_1 n_2 n_3} = \frac{\hbar^2 \pi^2}{2m}\left(\left(\frac{n_1}{L_1}\right)^2 + \left(\frac{n_2}{L_2}\right)^2 + \left(\frac{n_3}{L_3}\right)^2\right)$$

$$= \frac{\hbar^2 \pi^2}{2m}\frac{1}{L_1^2}\left(\left(\frac{n_1}{1}\right)^2 + \left(\frac{n_2}{2}\right)^2 + \left(\frac{n_3}{3}\right)^2\right)$$

$$= E_0\left(n_1^2 + \left(\frac{n_2}{2}\right)^2 + \left(\frac{n_3}{3}\right)^2\right)$$

| $n_1$ | $n_2$ | $n_3$ | $E/E_0$ |
|---|---|---|---|
| 1 | 1 | 1 | 1.361 |
| 1 | 1 | 2 | 1.694 |
| 1 | 2 | 1 | 2.11 |
| 1 | 1 | 3 | 2.25 |
| 1 | 2 | 2 | 2.44 |
| 1 | 2 | 3 | 3 |
| 1 | 1 | 4 | 3.03 |
| 1 | 3 | 1 | 3.36 |
| 1 | 2 | 4 | 3.78 |
| 1 | 3 | 2 | 3.69 |