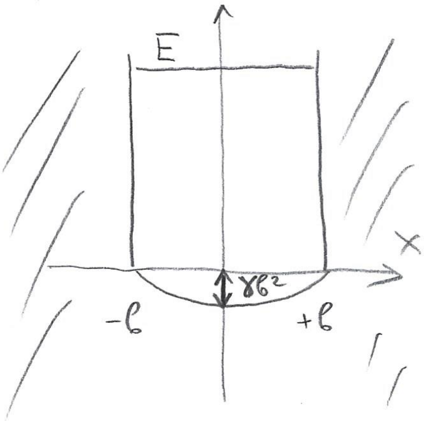

Bohr – Sommerfeld quantization rule for the case of a potential with two vertical walls is

$$n\pi\hbar = \int_{-b}^{b} \sqrt{2m(E - V(x))}\, dx$$

Since $E \gg \gamma b^2$ we can essentially neglect $V(x)$ in the integrand. As a result we have an infinite squre well:

$$n\pi\hbar = \int_{-b}^{b} \sqrt{2mE}\, dx = 2b\sqrt{2mE} \qquad n = \frac{2b\sqrt{2mE}}{\pi\hbar}$$

or

$$E_n = \frac{n^2\pi^2\hbar^2}{8mb^2}$$

For the next level $(n+1)$ the energy is

$$E_{n+1} = \frac{(n+1)^2\pi^2\hbar^2}{8mb^2}$$

then

$$\Delta E = E_{n+1} - E_n = \frac{(2n+1)\pi^2\hbar^2}{8mb^2} = \frac{\left(\frac{4b\sqrt{2mE}}{\pi\hbar} + 1\right)\pi^2\hbar^2}{8mb^2}$$

If n is known to be large we can simplify it further:

$$\Delta E \approx \sqrt{\frac{E}{2m}}\,\frac{\pi\hbar}{b}$$