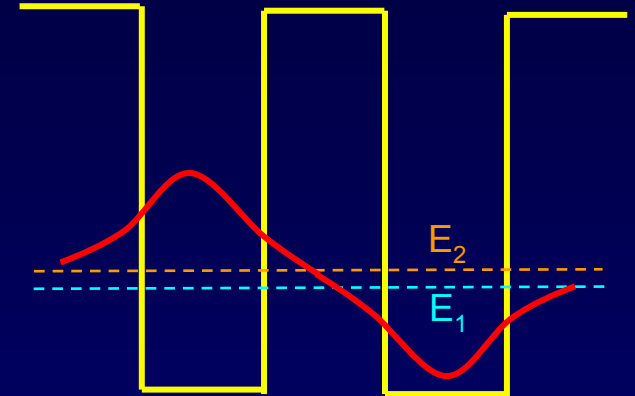# Solution

Consider the double well shown. The two energy levels of interest are E_1 = 1.123 eV and E_2 = 1.124 eV. At t = 0, Ψ is in a superposition that maximizes its probability on the left side.

1) At what time will the probability be maximum on the right side?

The period of oscillation is:

$$T = h/(E_2-E_1) = 4.135 \times 10^{-15} \text{ eV·s} / 0.001 \text{ eV} = 4.1 \times 10^{-12} \text{ s.}$$

We want a half period: $T/2 = 2.1 \times 10^{-12}$ s = 2.1 ps.

2) If the barrier is made wider, will the time become larger or smaller? What about E_2-E_1?

A wider barrier will have a smaller tunneling rate, so T/2 will increase. This implies that E_2-E_1 becomes smaller.

We'll see (week 7) that this effect is important in chemical bonding.