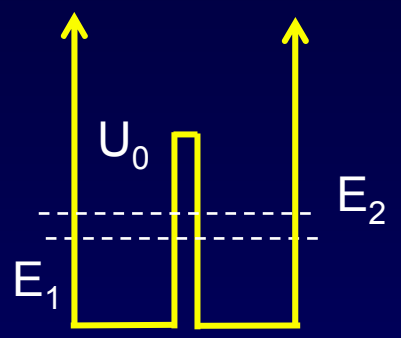
# Solution

You are trying to make a laser that emits violet light ($\lambda$ = 400 nm), based on the transition an electron makes between the ground and first-excited state of a double quantum well as shown. Your first sample emitted at $\lambda$ = 390 nm.




What could you modify to shift the wavelength to 400 nm?

a. decrease the height of the barrier

b. increase the height of the barrier

c. decrease the width of the barrier

The frequency of the electron oscillating between the left and right well was too high → the probability to "tunnel" was too high! You can reduce this by increasing the barrier height.

The wavelength of the emitted photon was too low → the frequency of the photon was too high → the energy splitting between the ground and first-excited state was too large. Raising the barrier makes the difference in energy $E_2$-$E_1$ smaller. Why?