③ In the Ramsauer effect, electrons are sent through a gas of noble atoms. When the electron beam has an energy $E = 0.7\ eV$, the electrons pass through the gas as if the atoms were not there. In other words the transmission coefficient $T = 1$ when $E = 0.7$. Model the atoms as a square well with width 0.2 nm and depth $V < 0$. ① Find the depth V of the well. ② Use cups "Stationary Scattering States in 1-D" to plot T vs E ③ Plot the wave function at $E_1 = 0.7$ and at other values, $E = 0.3$ & $E = 8\ eV$. ④ Find the energy E_2 at which $T = 1$ for the next highest energy. ⑤ Plot the wave function at $E = E_2$ and at $E = 0.9 E_2$. Explain the difference.

Use "Square Barrier" with $V_0 < 0$ and $x_{min} = -0.1$ nm and $x_{max} = 0.1$ nm

(4)

Double Barrier Resonances

Do CUPS 3.9 a & b

Use "direct integration" option under parameters

Use potential "Double Square"

Set $x_{-1} = -0.1$ & $x_{-2} = 0.1$

~~Use~~ Vary V_0 from 10 - 1000

- Do parts a & b with $V_0 = 1000$
- Plot T vs E for $E \in (0.1, 100)$
- Plot ψ for $E = 31eV$ and $E = 33eV$

Explain both plots

$x_{min} = -0.105$ $\quad x_{-1} = -0.1$

$x_{max} = +0.105$ $\quad x_{-2} = +0.1$

$V_0 = 1000$

What is the energy of the first resonance?
What does the wave function look like?
What is the energy of the second resonance?
What does the wave function look like?
What is the ratio of E_2/E_1? Why?