Problem Set 5
Physics 386 / Spring 1997
Professor Klaus Schulten

Problem 1: Barrier Penetration

Calculate the transmission coefficient for electrons of energy 5 eV, incident on a one-dimensional rectangular barrier of width 10^{-7} cm and height 6 eV.

Problem 2: Transmission for a Potential Step 1

For scattering at a one-dimensional potential step as discussed in class, i.e., $V(x) = 0$ for $x < 0$ and $V(x) = V_o$ for $x \geq 0$ calculate the transmission coefficient $T(V_o, E)$ as a function of E. Take $V_o = 1$ eV.

Problem 3 : Transmission for a Potential Step 2

For the potential step of Problem 2, derive the wave function in the case that a wave is incident from the direction $x \to \infty$ and moves towards $x \to -\infty$. Take the incident wave to have the form of a plane wave.

Problem 4: Scattering of a Rectangular Barrier

Describe the scattering by a one-dimensional potential barrier, as above, but for the case that the energy of the incident wave is larger than the barrier height.

This problem set needs to be handed in by Wednesday, March 12, 1997.