Modern Physics (PHY 3305) Lecture Notes

HomeworkAssignment007

SteveSekula, 18 March 2010 (created 18 March 2010)

Expectations for the quality of your handed-in homework are available at http://www.physics.smu.edu/sekula/phy3305 /homework.pdf. Failure to meet these guidelines will result in loss of points as detailed in that document. This assignment covers material from Harris Ch. 9.1,9.3,9.5-9.7. It is worth 100 points.

| no tags |

- -

HARRIS *CH9-2* (5 Points)
HARRIS *CH9-19* (20 Points)
HARRIS *CH9-35* (20 Points)
Problem *SS-10* (See Below)
HARRIS *CH9-66* (30 Points)

- -

Problem *SS-10* (25 Points)

Consider the following potential well, containing the energy levels indicated ($n = 1, 2, 3$ and $E = E_0, 2E_0, 3E_0$). You have 5 electrons that you can place in this well.
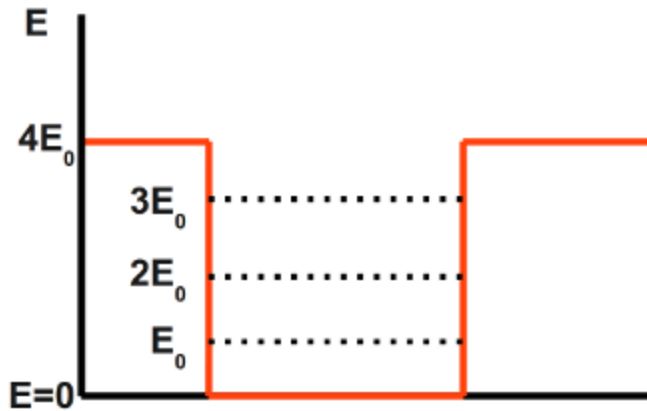
1. Make your own drawing of the potential well, showing (e.g. by sketching circles on the energy levels) where the 5 electrons will be when the system has the lowest possible total energy. Next to each electron circle in your drawing, label the state of that electron using all of its quantum numbers.
2. What are the occupation numbers corresponding to $E = E_0$, $E = 2E_0$, and $E = 3E_0$?
3. Indicate on your drawing where the Fermi energy is located.
4. What is the work function of the system described by this well?