

**King Fahd University of Petroleum and Minerals**  
**Physics Department**  
**Phys-212: Modern Physics**  
**Spring 2006**

**Assignment # 3**

**Date: Thu. Mar. 16, 2006**

**Due Date: Wed Mar.22, 2006**

*I encourage group discussion, but not copying (cheating).*

**Problem. 1**

Determine the distance of closest approach of 1.00 MeV protons incident on gold nuclei.

**Problem. 2**

What is the shortest wavelength present in the Bracket series.

**Problem. 3**

Find the quantum number that characterizes the earth's orbit around the sun.

**Problem.4**

A proton and an electron combine to form a hydrogen atom in the ground state. A single photon is emitted. What is its wavelength?

**Problem.5**

Find the wavelength of the spectral line that corresponds to a transition in the hydrogen from the  $n=10$  state to the ground state. In what part of the spectrum is this?