

Physics 008: The Quantum World Around Us

Spring 2007

Homework Assignment #3

Due Thursday 2/8/07

Name: _____

Answer the following questions based on our class discussions, the *Scientific American* article by Pake, and the magnetic resonance web pages that are linked to the web page for this course (see ‘web sites of interest’).

1. Explain the meaning of each of the three words in the term ‘nuclear magnetic resonance.’

The word ‘nuclear’ is not commonly used in conjunction with the term MRI (magnetic resonance imaging). Why do you think this is the case?

2. What is the meaning of the term “functional MRI”?

3. Explain briefly, in your own words, how NMR provides information about the structure of molecules. Your explanation should address the following questions: Why is the position of a peak in an NMR spectrum related to the magnetic field experienced by an atom? Why might different atoms in a sample experience different magnetic fields, even though the entire sample is placed in a uniform magnetic field?
4. Name at least one advantage of MRI over other common medical imaging methods such as x-rays.