

Physics III

Homework Five

College of the Atlantic

Due Friday 2 May, 2014

1. MacIntyre, Problem 1.5, parts a and b.
2. A quantum system is in the state

$$|\psi\rangle = \frac{1}{\sqrt{5}} (2i|+\rangle - |-\rangle) . \quad (1)$$

- (a) Suppose that S_z is measured. What is the probability of obtaining the result $S_z = +1$?
 - (b) Suppose that such a measurement is carried out and the results $+1$ is indeed obtained. What state is the quantum system in, post-measurement?
 - (c) Now suppose that S_x is measured. What is the probability of obtaining $S_x = -1$?
3. What is the wavelength of 620 kHz radio waves?
 4. What is the frequency of blue light with a wavelength of 425 nm?
 5. Suppose the temperature of my woodstove increases from 400 to 600 degrees Fahrenheit. By what factor does the total energy radiated by the woodstove increase?
 6. Krane, problem 3.4
 7. Talk to me about ideas for a project for this class or write a paragraph or two about possible project topics that would be of interest to you.
 8. **Optional:** Krane problems 3.1 and 3.2. These require the use of calculus to derive relations among several of the blackbody equations.