

Physics 140 – Week of November 26

Reading

For 11/28 – R&P §9.1.

For 11/30 – R&P §9.2:

1. What did you find difficult or confusing about the reading? If nothing was particularly difficult, what was most interesting? Please be as specific as possible.

Problems

- The problem assigned Monday in class: Work through the Bernstein-Vazirani problem for the case of a two-bit string $u = (u_1, u_0)$, writing the states of the two qubits (or when necessary, of the entangled two-qubit system), as well as the state of the temporary bit, at each stage of the computation.
- Write a program in Python that will search (classically) an unstructured list. You can create your own list (of anything, as long as it's large) and search it for something of interest. Or you can choose the following academic option: Create a scrambled list of the first 2^{20} integers by doing

```
from random import shuffle
a=range(2**20)
shuffle(a)
```

Search this list for a number which is a perfect square greater than one million. (You can use the square root function from numpy (`from numpy import sqrt`), but it returns a floating point number. You still will have to use this information to decide if the number is a perfect square.) In any case, your program should output the element of interest, the place in the list where it was found, and the number of elements in the list checked. Run the program a bunch of times. How many elements does it check on average? How does this average depend on the number of “good” elements?
- R&P 9.4
- Submit a problem for the final exam. Write a good one! I will base the exam on your problems. (Obviously if this is going to work you can't discuss your problem with other members of the class.)

As a reminder, reading responses are due in my email inbox (ekb2@stmarys-ca.edu) at 9:00 p.m. the night before class. Problem sets are due Monday at 4:00 p.m., in the manila envelope outside my office.