

Physics 140 – Week of September 3

Reading

For 9/5 – Reread R&P §2.2, followed by §2.3.

1. Why can't we just say that the state $|\nearrow\rangle = \frac{1}{\sqrt{2}}(|\uparrow\rangle + |\downarrow\rangle)$ is a probabilistic mixture of states $|\uparrow\rangle$ and $|\downarrow\rangle$? Try to answer with a specific example where this sloppy language would get us into trouble.
2. 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.

For 9/7 – From <http://quantum.phys.cmu.edu/QCQI/#csnotes>, download Robert Griffiths's lecture on "Quantum Cryptography" and read the introductory section (to p. 3). Follow that with http://en.wikipedia.org/wiki/One-time_pad. If you need help with modular arithmetic, the examples in http://en.wikipedia.org/wiki/Modular_arithmetic should get you through.

1. Decrypt the Valentine's message given as an exercise on p. 2 of Griffiths's lecture.
2. 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.

For 9/10 – R&P §2.4.

1. When Alice and Bob choose different bases for their measurements, the chance that their bits match is only 50%. How do R&P come up with that number, 50%?
2. 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

- R&P 2.3,¹ 2.4, 2.6, 2.7(c,d).

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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.

¹Note definitions for $|+\rangle$, $|-\rangle$, etc. p. 22.