Announcements:
• Final Projects – give me your 1st pass ideas today

• Ass. #6 due Friday 3/3; no class so drop it off in my office
  408 CB or e-mail it to me

Today:
• discuss final projects

• comments on WS#5 and expectation values

• begin Worksheet #6 (finish Wed.)
# Team Assignments

<table>
<thead>
<tr>
<th>Team</th>
<th>Name</th>
<th>Job (#6)</th>
<th>(from #5)</th>
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<tbody>
<tr>
<td>1</td>
<td>Eric</td>
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<td>recorder</td>
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<td>Dave</td>
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<td>analyst</td>
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<td>manager</td>
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<td>manager &amp; speaker</td>
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<tr>
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<td>Joe</td>
<td>manager &amp; speaker</td>
<td>analyst</td>
</tr>
<tr>
<td>3</td>
<td>Daniel</td>
<td>analyst</td>
<td>recorder</td>
</tr>
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"We choose to examine a phenomenon which is impossible, absolutely impossible, to explain in any classical way, and which has in it the heart of quantum mechanics. In reality, it contains the only mystery." R. P. Feynman, Lectures on Physics

Voted the most beautiful experiment in physics (Physics World 2002)
Now with Electrons

\[ P = P_A + P_B \]

\[ P \neq P_A + P_B \]
Assignment #6:

• skip 1st page, we’ll discuss together

• go through Model #1 & stop after #9 for discussion

• do not do Exercises in class unless your group is ahead & waiting (do them on your own for further edification)

• we’ll finish (at least) through activity 8 today
from D. A. McQuarrie, Quantum Chemistry (University Science Books, 1983)

from biography of Michael Kasha in The Spectrum 18, 4 (2005)
**Postulate II.** Every dynamical variable (or physical observable) is represented by a corresponding linear operator.

**Postulate III.** When a dynamical variable \( A \) is measured (without experimental error), there are only certain possible values that may be obtained. These values are the eigenvalues \( a_i \) of the operator \( \hat{A} \) as given by

\[
\hat{A} \phi_i = a_i \phi_i
\]

where \( \phi_i \) is one of the eigenfunctions of the operator \( \hat{A} \) representing the dynamical variable \( A \).

When a system is not in an eigenstate of the observable \( A \) of interest, it is possible to say much more than simply the result of a measurement must be one of the eigenvalues of the operator \( \hat{A} \). It is a property of observable operators \( \hat{A} \) that the set of all eigenfunctions of such an operator \( \{\phi(\tau)\} \) forms a complete basis set with which any wavefunction in of the system \( \psi(\tau) \) may be expanded:

\[
\psi(\tau) = \sum_i c_i \phi_i(\tau)
\]  

(0-1)

“\( \tau \)” here denotes all of the coordinates of the system. The coefficients \( c_i \) in expansion 0-1 provide the relative probabilities \( P(\phi_i) \) that a measurement of \( A \) will find the system in the eigenstate \( \phi_i \) and the measurement of \( A \) will therefore yield the value \( a_i \) in the following manner:

\[
P(\phi_i) = \frac{c_i^* c_i}{\int \psi^*(\tau) \psi(\tau) d\tau}
\]  

(0-2)

If a measurement is made on a collection of systems all in the state \( \psi(\tau) \) the average or expectation value of the observable \( A \) is given by:

\[
< A > = \sum_i P(\phi_i) a_i = \frac{\int \psi^*(\tau) \hat{A} \psi(\tau) d\tau}{\int \psi^*(\tau) \psi(\tau) d\tau}
\]  

(0-3)