Quantum Logic

Consider a free particle with

$$\hat{H} = -\frac{\hbar^2}{2m}\frac{\partial^2}{\partial x^2}$$

in some initial quantum wave packet $|\psi\rangle$.

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1. What do you get when you measure the energy?
2. What state was the system in before the measurement?

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2. What state was the system in before the measurement?
3. What state is the system in after the measurement?
4. What do you get when you measure the energy again?

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4. What do you get when you measure the energy again?
5. What do you get when you measure p?

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6. What do you get when you measure the position x?

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3. What state is the system in after the measurement?
4. What do you get when you measure the energy again?
5. What do you get when you measure p?
6. What do you get when you measure the position x?
7. Do $\hat{x}$ and $\hat{p}$ commute?

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4. What do you get when you measure the energy again?
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6. What do you get when you measure the position x?
7. Do $\hat{x}$ and $\hat{p}$ commute?
8. What do you get when you measure the energy again?

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in some initial quantum wave packet $|\psi\rangle$.

1. What do you get when you measure the energy?
2. What state was the system in before the measurement?
3. What state is the system in after the measurement?
4. What do you get when you measure the energy again?
5. What do you get when you measure p?
6. What do you get when you measure the position x?
7. Do $\hat{x}$ and $\hat{p}$ commute?
8. What do you get when you measure the energy again?
9. What state was the system in before the previous measurement?

You’ve Got To Be Kidding Me

- “I cannot seriously believe in the quantum theory...”

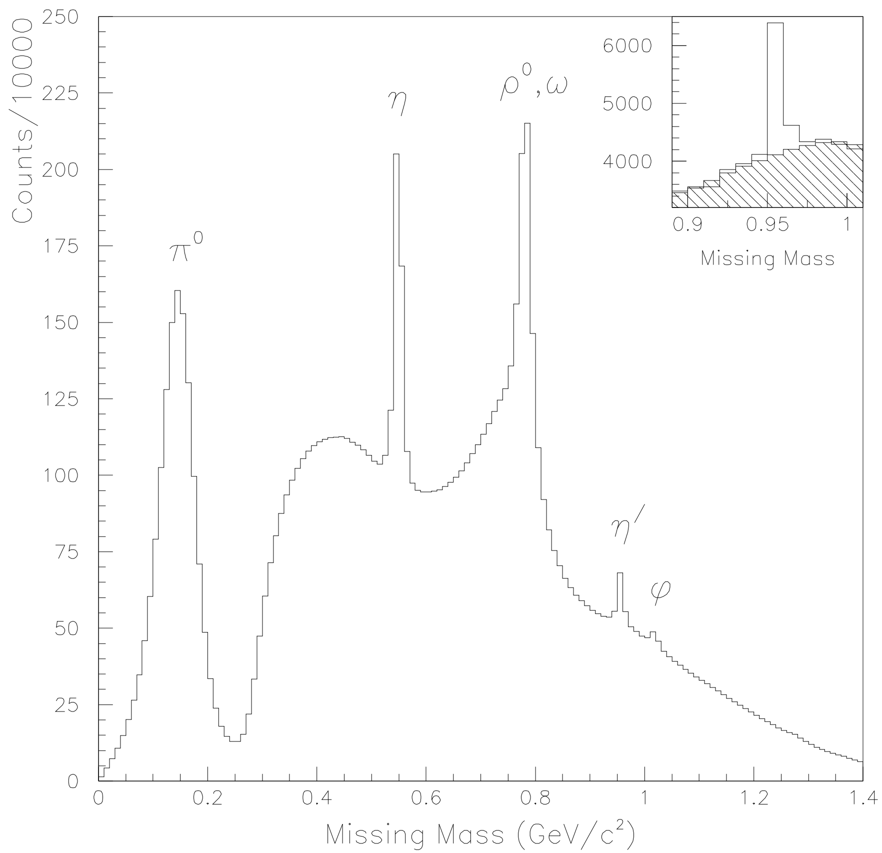
  Albert Einstein

- “The more success the quantum theory has the sillier it looks.”

  Albert Einstein

Relating ΔE and Δt

The figure shows the final state energy of the nuclear reaction $\gamma p \to pX$. The labeled states are mesons (quark-antiquark pairs) formed in the reaction. The energy widths of two states are $\Delta E_\omega = 8.4\ \mathrm{MeV}$ and $\Delta E_{\rho^0} = 151\ \mathrm{MeV}$. What other information do these widths give us?



M.Dugger,..., G.P.Gilfoyle et al. (the CLAS Collaboration), Phys. Rev. Lett., **96**, 062001 (2006).

A Recent Discovery

The Higgs Boson