Part 1

1. What is the centenary of quantum mechanics?
2. What is the meaning of linearity in quantum mechanics?
3. What is the difference between classical physics and quantum physics?
4. What is the most famous example of a linear theory?
5. What is the purpose of the linear operator in a linear equation?
6. What is the equation of motion for a linear equation?
7. What are the two properties of a linear operator?
8. How can you write the linear operator L in terms of a differential equation?

Answers:

1. The centenary of quantum mechanics will be in 2025.
2. Linearity in quantum mechanics means that if you have two solutions, you can add them together and you get a new solution. It also implies that if you have a single solution, you can scale it by a number and it is still a solution.
3. Classical physics is a good approximation, but it is conceptually very different from the way things really work. Quantum physics has replaced classical physics as the correct description of fundamental theory.
4. The most famous example of a linear theory is Maxwell's theory of electromagnetism.
5. The purpose of the linear operator in a linear equation is to act on the unknown variable U and produce an equation of the form L on U equal 0.
6. The equation of motion for a linear equation is L on U equal 0.
7. The two properties of a linear operator are that it must satisfy L on A times U is equal to A, L, U and L on U1 plus U2 is equal to L U1 plus L U2.
8. The linear operator L can be written in terms of a differential equation as D U, D T, plus 1 over tau U equals 0.