PHYSICS AND ASTRONOMY

CAP LECTURE

Dr. Jeff Lundeen

University of Ottawa

"Seeing is Believing: Direct Observation of the Wavefunction"

Abstract

Textbooks introduce the quantum wavefunction without really explaining what it is. Is it just a powerful abstract notion that we use for calculations? Is a particle's wavefunction the shape of the particle? Does a single particle even have a wavefunction, or is it only something we should apply to collections of many particles? If you're confused, you are not alone. These questions have perplexed many famous physicists over the last century but, recently, researchers have made some progress towards answers. I will introduce you to this new research. I will also present my contribution, a general experimental method to directly observe the wavefunction. The method gives the wavefunction a plain and general meaning in terms of straightforward operations in the lab. I will describe our experiment, in which these operations amount to measuring the position and momentum of a photon. I will explain why this does not violate Heisenberg's uncertainty principle but, surprisingly, does directly give both the real and imaginary parts of the wavefunction.

Friday, March 14, 2014
3:30 p.m.
Elliott Building
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