

Quantum Weirdness: A Beginner's Guide

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The word “quantum” is often used to describe scientific phenomena, or indeed, an advance in a certain field. Despite its profound conceptual and philosophical challenges to Physicists, we can use quantum physics in a wide variety of everyday applications. In this lecture series, I will discuss the basics of what “quantum phenomena” are, and what they are not, and show how we experience quantum phenomena in a variety of everyday life situations. This will be a non-mathematical discussion of quantum phenomena and quantum mechanics. No knowledge of physics or mathematics is required.

Schedule of topics:

Week 1

“What is “Quantum?”: Energy, Waves, Particles, and Wave-Particle Duality. The Quantum in art, music and media.

Week 2

Early Quantum Theory: the problems with classical physics

Week 3

“Schrödinger and his Cat”: The Schrödinger Equation, Schrödinger’s Cat. Electron Spin and Magnetism

Week 4

“What Does It Mean?”: Interpreting Quantum Mechanics: The Copenhagen, Pilot-Wave and Many Worlds Interpretations.
Quantum Tunnelling.

Week 5

The Uncertainty Principle
The Laser
Quantum Zeno Effect
Quantum Entanglement

Week 6

Quantum Weirdness in Materials

Quantum Cryptography

Quantum Teleportation

“Quantum Snake Oil”: What quantum physics isn’t!

Recommended readings for continued learning:

“How To Teach Quantum Physics To Your Dog”, by Chad Orzel , ISBN 978-1-4165-7229-9

Video

Quantum entanglement:

<https://www.scienceandnonduality.com/videos/brilliantly-simple-explanation-of-quantum-entanglement/>