

# Quantum Mechanics: Theory and Experiment

By Mark Beck

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## Quantum Mechanics: Theory and Experiment By Mark Beck

This textbook presents quantum mechanics at the junior/senior undergraduate level. It is unique in that it describes not only quantum theory, but also presents five laboratories that explore truly modern aspects of quantum mechanics. These laboratories include "proving" that light contains photons, single-photon interference, and tests of local realism.

The text begins by presenting the classical theory of polarization, moving on to describe the quantum theory of polarization. Analogies between the two theories minimize conceptual difficulties that students typically have when first presented with quantum mechanics. Furthermore, because the laboratories involve studying photons, using photon polarization as a prototypical quantum system allows the laboratory work to be closely integrated with the coursework.

Polarization represents a two-dimensional quantum system, so the introduction to quantum mechanics uses two-dimensional state vectors and operators. This allows students to become comfortable with the mathematics of a relatively simple system, before moving on to more complicated systems. After describing polarization, the text goes on to describe spin systems, time evolution, continuous variable systems (particle in a box, harmonic oscillator, hydrogen atom, etc.), and perturbation theory.

The book also includes chapters which describe material that is frequently absent from undergraduate texts: quantum measurement, entanglement, quantum field theory and quantum information. This material is connected not only to the laboratories described in the text, but also to other recent experiments. Other subjects covered that do not often make their way into undergraduate texts are coherence, complementarity, mixed states, the density operator and coherent states.

Supplementary material includes further details about implementing the laboratories, including parts lists and software for running the experiments. Computer simulations of some of the experiments are available as well. A solutions manual for end-of-chapter problems is available to instructors.

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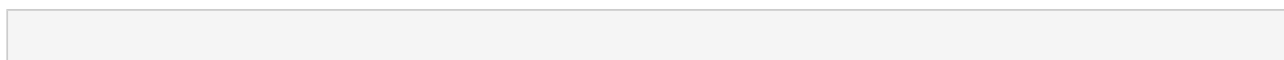
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## **Quantum Mechanics: Theory and Experiment** By Mark Beck Bibliography

- Sales Rank: #926463 in Books
- Brand: Brand: Oxford University Press
- Published on: 2012-05-31
- Original language: English
- Number of items: 1
- Dimensions: 6.50" h x 1.30" w x 9.40" l, 1.85 pounds
- Binding: Hardcover
- 528 pages



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## **Editorial Review**

Review

"I think this is an excellent text, and I recommend it strongly for an advanced undergraduate course in quantum mechanics."

-- Mark Fox, University of Sheffield

About the Author

Mark Beck received his Bachelor's and Doctoral degrees in Optics from the University of Rochester. He has taught physics at Reed College, and is currently the Benjamin H. Brown Professor of Physics at Whitman College. His research interests include quantum optics and quantum measurement.

## **Users Review**

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**Krystal Wilson:**

This Quantum Mechanics: Theory and Experiment book is absolutely not ordinary book, you have after that it the world is in your hands. The benefit you get by reading this book will be information inside this reserve incredible fresh, you will get facts which is getting deeper an individual read a lot of information you will get. This specific Quantum Mechanics: Theory and Experiment without we realize teach the one who reading through it become critical in imagining and analyzing. Don't always be worry Quantum Mechanics: Theory and Experiment can bring once you are and not make your carrier space or bookshelves' grow to be full because you can have it within your lovely laptop even mobile phone. This Quantum Mechanics: Theory and Experiment having excellent arrangement in word and also layout, so you will not truly feel uninterested in reading.

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