

PHYS 451 – HOMEWORK # 3 – DUE TUESDAY, 10/17/2013

1. P4.13 p.126.
2. P4.14 p.126.
3. P4.17 p.127.
4. P4.21 p.128.

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**Key**

Unless otherwise specified, questions and problems are from the course textbook:

Richard W. Robinett  
*QUANTUM MECHANICS (SECOND EDITION)*  
Oxford University Press (2006)  
ISBN-13: 978-0198530978

**P(Q)X.Y p.Z** means “Problem (Question) P(Q)X.Y of Chapter X, page Z.”

Example: Problem P1.2 p.24 = Problem P1.2 of Chapter 1, page 24.

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Quantum mechanics is the branch of physics that describes fundamental subatomic behavior. The basic principle of quantum mechanics is that there is an uncertainty in the location of a subatomic particle until it is observed. This explains why the Second Law of Thermodynamics is always true, and why everyone declines with old age. Quantum mechanics explains the discrete nature of small-scale interactions, wave-particle duality, the uncertainty principle, and quantum entanglement. Quantum mechanics Quantum mechanics, also known as quantum physics or quantum theory, is a theory of physics providing a mathematical description of the interaction of matter and energy. The theory was developed in 1925 by Werner Heisenberg.[1] Quantum mechanics describes the time evolution of physical systems via a mathematical structure called the wave function.Â 3.1 Quantum mechanics and classical physics. 3.2 Relativity and quantum mechanics. 3.3 Attempts at a unified field theory. 4 Philosophical implications.

Quantum mechanics is the foundation of several related disciplines including nanotechnology, condensed matter physics, quantum chemistry, structural biology, particle physics, and electronics. The term "quantum mechanics" was first coined by Max Born in 1924. The acceptance by the general physics community of quantum mechanics is due to its accurate prediction of the physical behaviour of systems, including systems where Newtonian mechanics fails. Quantum mechanics explains how the universe works at a scale smaller than atoms. It is also called quantum physics or quantum theory. Mechanics is the part of physics that explains how things move and quantum is the Latin word for 'how much' . A quantum of energy is the least amount possible (or the least extra amount), and quantum mechanics describes how that energy moves or interacts.

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Quantum mechanics is the science of the very small. It explains the behavior of matter and its interactions with energy on the scale of atomic and subatomic particles. By contrast, classical physics explains matter and energy only on a scale familiar to human experience, including the behavior of astronomical bodies such as the Moon. Classical physics is still used in much of modern science and technology. However, towards the end of the 19th century, scientists discovered phenomena in both the large Quantum Mechanics - Essential Things To Know. Most people hear this term tossed around sometime or the other. This post will cover the basic properties and essential things that one should know if they want to comprehend Quantum Mechanics.Â Quantum mechanics is the branch of physics that deals with the behavior of matter and light on a subatomic and atomic level. It attempts to explain the properties of atoms and molecules and their fundamental particles like protons, neutrons, electrons, gluons, and quarks.

Quantum mechanics is the extension of classical mechanics into the microscopic world, the world of atoms and molecules and of atomic nuclei and elementary particles. The need for a revision of the foundations of mechanics arises as a result of the wave-particle duality of matter, which manifests itself in systems of atomic dimensions. Wave-particle duality means that particles, such as electrons or protons, have properties characteristic of both waves and particles. Quantum Mechanics. Richard Fitzpatrick Professor of Physics The University of Texas at Austin. Contents. Problems in Quantum Mechanics, G.L. Squires, (Cambridge University Press, Cambridge UK, 1995). Quantum Physics, S. Gasiorowicz, 2nd Edition, (John Wiley & Sons, New York NY, 1996). Nonclassical Physics, R. Harris, (Addison-Wesley, Menlo Park CA, 1998). Introduction to Quantum Mechanics, D.J. Griffiths, 2nd Edition, (Pearson Prentice Hall, Upper Saddle River NJ, 2005).

6. 1.3 Aim of Course. Quantum mechanics (QM) is a branch of physics developed to deal with the behavior of atoms, molecules, and sub-atomic particles. Most of the foundations of QM were laid down during the first three decades of the 20th century. Since then, it has been used extensively in the study of chemistry and materials, including biological research, and in cosmology, astrophysics and astronomy.