

Kursplan för Kvantfysik (1FA521) för F3 ht 2014, period 1&2

Föreläsningar:

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Lektioner:

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Laborationer:

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Hemsida: <http://studentportalen.uu.se/>

Web-registrering, kursmaterial att hämta hem, tips och länkar.

Schema: <http://se.timeedit.net/web/uu/db1/schema/>

Kursböcker:

P.A. Tipler and R.A. Llewellyn, *Modern Physics*, 5th ed., Freeman and Company, New York, 2008 (ISBN 0-7167-7550-6)

D.J. Griffiths, *Introduction to Quantum Mechanics*, 2nd ed., Pearson Int., NJ (ISBN 0-13-191175-9)

S. Gasiorowicz, *Quantum Physics*, 3rd ed., Wiley, New York (ISBN 0-471-42945-7)

C. Nordling och J. Österman, *Physics Handbook*, Studentlitteratur, 1999 eller senare.

Laborationer:

Optical spectroscopy of hydrogen

Photoelectric effect

X-ray spectroscopy >> with small oral presentation in English (=> 1 bonus point)

Tentamen: October 13 and December 12, 2014. Required is 40% to pass (13 out of 30 points max.)

Kvantfysik, 10hp, föreläsnings innehåll:

1. Introduction, background of Quantum Physics, principle of quantization, black body radiation
2. Photoelectric effect, Compton scattering (duality of waves-particles), Rutherford and Bohr atomic models
3. De Broglie wave length, experimental confirmation, uncertainty relations (simple form)
4. Schrödinger equation, time dep., and time independent; wave function, probability interpretation
5. Operators, expectation values
6. Infinite square well
7. Scattering from potential barriers, quantum tunnelling
8. The harmonic oscillator (full solution)
9. Extensions of the Schrödinger equation to more dimensions
10. Formalism of quantum mechanics, bras and kets, Heisenberg uncertainty
11. The hydrogen atom I
12. The hydrogen atom II
13. Angular momentum
14. Spin, addition of angular momenta
15. Many electrons, Pauli principle, shell structure of atoms, the Periodic Table
16. Formalism, harmonic oscillator with ladder operators
17. Nondegenerate perturbation theory
18. Fine structure; identical particles, fermions and bosons
19. Di-atomic molecules and bonding