

PHYS 550

Introduction to Quantum Mechanics

Maxim Lyutikov

PHYS 324

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[http://www.physics.purdue.edu/academic-programs/
courses/course_detail.php?c=phys550](http://www.physics.purdue.edu/academic-programs/courses/course_detail.php?c=phys550)

Area of research: theoretical
astrophysics, plasma physics.
I am looking for a grad student.

No special office hours - just stop by or arrange by email.

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Basic course in non-relativistic quantum mechanics

- Principles of QM (operators, wave functions, measurements, different representations)
- Energy and momentum
- Schroedinger equation in 1D
- Angular momentum and Hydrogen atom
- Spin

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- Motion in magnetic field
 - Perturbation theory
 - Quasi-classical regime
 - Identical particles, secondary quantization
 - Elastic collisions

Not covered: radiation, relativistic QM.

- Ask questions at any moment!
- What is obvious for me might be a discovery for you - do not miss your chance to make (a personal) discovery!

- I'll stress the principles (not exact formulae)
 - A simple (the simplest) model of an electron & proton is highly mathematically complicated
 - many results in QM can be derived in your head (OK - with pen & pencil)
- We'll concentrate on simple model problems (often repeating derivations using different methods - harmonic oscillator)
- I'll skip important mathematical details and will just give the answer (e.g. zero fluctuations)
- Yet, the mathematics of QM is difficult, no way to avoid is completely, will try to make as easy as possible.

Recommended Books

- Introduction to quantum mechanics David J. Griffiths (David Jeffery),

Print Available: Physics Physics (Reserves) (530.12 G875i 2005)

- Quantum mechanics : Non-relativistic theory
L. D. Landau (Lev Davidovich); E. M. Lifshits (Evgenii Mikhaïlovich)

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- There will be no hand-outs - write down what you think is important

Homework

- 3-5 problems, approximately once per week (few difficult problems - not many simple ones). Start early.
- Write down the intermediate steps - not just the answer
- Must turn in before the class starts - we'll be discussing the solutions

Grading

- Homework 30%
- Midterm 30%
- Final 40%
- Bonus points for those willing to give a presentation - do ask me within a week or so.
- No relative grading (everyone can possibly get A+)

Collaboration policy

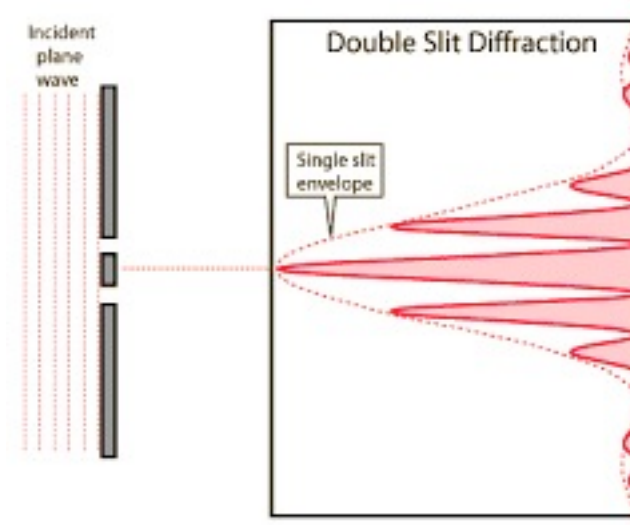
- Collaboration is strongly encouraged (but not copying!) Talk to each other - that's how progress in science is made!
- If a problem has been done in close collaboration, please state that
- Grades will not be normalized (everyone can get A+).

Wave-particle duality

- Is light a wave or a particle?



particle propagating along
straight path



waves - diffraction, interference

Electron diffraction

