Notes on Lecture 1
Advanced Quantum Mechanics

Sixten Nordegren

Introduction

Everyone is introducing themselves.

Teachers

- Igor Pitovski
  Email: `igor.pikovski@fysik.su.se`
- Elisabeth Edvardsson
  Email: `elisabeth.edvardsson@fysik.su.se`

About the course

- 15 lectures
- 1 lab demonstration (M.Bouremanne `Not sure i spelled this right!`)
- 15 tutorials: exercises in class (Edvardsson, in person)
- 4 Hand in homework assignments (max 20% of final grade)
- Book: J.J Sakurai "Modern QM"
  Will go through Ch.1-6, most but all topics covered. Some complementary topics. Whatever edition is fine.

Course content

- Feeds into many other subjects:
  - **QFT**
  - **Standard Model**
  - **Particle physics**
  - **Condensed matter physics**
  - **Quantum gravity**
  - **Cosmology**

Topics to be covered

- Mathematical foundations
  - Description Hilbert space
  - Measurements
  - Mathematical tools
- Composite systems & entanglement
- Two - level systems / Spin systems
- Continuous variable systems
- Dynamics , Schrödinger evolution, Heisenberg picture, path integrals
- Symmetries
- Angular momentum
- Approximate techniques for solutions:
  - Perturbation theory (time-dependent)
  - Scattering theory

Next lecture

- Mathematical foundations, (Linear algebra with Dirac notation)