Physics 6572: Graduate Quantum Mechanics I

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TAs: Michael Saelim (mjs496, PSB 430, office hours Fri 2-4)
and Michael Savastio (mps252, PSB 332, OH TTh 1:50-2:50)

Traditional Topics:

- Angular Momentum
- Bosons & Fermions
- Perturbation Theory
- Adiabatic Theorem, Born-Oppenheimer
- Scattering Theory
- Chemical Bonds, van der Waals

Advanced & Modern Topics:

- Entanglement, Qbits, Bell's Theorem
- Aharanov-Bohm Effect
- Berry's Phase
- Density Functional Theory, Pseudopotentials
- Relativity, Dirac Equation, Graphene

Things I think are important:

- Path Integrals, Classical Limit, WKB & Instantons
- Gauge Invariance & Charge
- Group Representation Theory
- Adiabatic Continuity: Resonances, Fermi Liquid Theory, Auger
- Dirt: Conductivity, Localization, Random Matrix Theory
- Overlap Catastrophes, Macroscopic Quantum Tunneling, Cats

Assuming Seen:
* Schrodinger's Eqn
* Probability, Currents, Uncertainty
* Eigenstates
* Square Well
**Harmonic Oscillator (Hermite Polynomials)
**Double Slit
Hydrogen
Perturbation Theory
Variational Methods

Text: Modern Quantum Mechanics (Second Edition),
J. J. Sakurai & J. J. Napolitano

Perspective: Grads
* Good at classwork, exams (selection effect)
* Variety of quantum backgrounds
* Need transition to research
* Need collaborative, oral presentation exposure

Experiment: Group projects
* Four? over semester
* Graded in oral exams, by peers? ["15 minute A-exam"]
* First two: prepare through (wacky) thought exercises,

Grading:
* 35% homework
* 25% group projects (?)
* 15% In-class prelim Friday October 5
* 25% Take-home final