

General course information

Physics 264 is a quantum mechanics course! The material has some overlap with what you would see in a math course on group representation theory, but the focus is entirely different. Symmetry arguments in quantum mechanics are arguably even more important than in classical mechanics - they are less intuitive and more powerful. This material is a critical part of the quantum mechanic's tool kit.

Section

Sections start this week! Section will be held (almost always) in Lyman 425 from 1:30pm-2:45pm. On Valentine's Day, 2/14, section will be held in Lyman 330 from 1:30pm-2:45pm.

Time/Location: Tu-Th 3-4:15pm, Jefferson 456 (Georgi's office)

Faculty: Howard Georgi, Jefferson 456, hgeorgi@fas.harvard.edu

My hours will be posted at least a few days in advance on my personal home page www.people.fas.harvard.edu/~hgeorgi/.

Textbook/materials

The primary text will be my book, **Lie Algebras In Particle Physics: from Isospin To Unified Theories (Frontiers in Physics) 2nd Edition**. In addition, there will be *Mathematica* materials expanding on the text, so it will be important to be able to use *Mathematica*.

Nothing will be handed out. All materials will be available in the files tab on the course website, canvas.harvard.edu/courses/67564/files. The first files have already started to appear.

TF: Nathan Leita, nleita@g.harvard.edu

Administrative Assistant: Elise Krims, Jefferson 464, ekrims@fas.harvard.edu

Typical week

I want to make the class doable for those who want to take it, so I am going to wait to set up a schedule until I know what works for the class. I will have lots of office hours on weekday afternoons and early evenings and will be at Physics Night on Wednesday evenings. If necessary, we could even set up online office hours at odd times.

Collaboration policy

Collaboration is encouraged on the problem sets. You should, however, type up your problem set on your own. You should also list your collaborators on the set. **And, if you share a piece of Latex or Mathematica code, be sure to identify this clearly and list your collaborators on that separately. This is important.**

Collaboration will NOT BE ALLOWED on the take-home final.

Grading

You will be graded on your contributions to the online discussion, your presentations in class (and to a lesser extent your written solutions), and there will be a take-home exam during reading period. I tend to be a very generous grader as long as the students make an earnest effort to do the work, but I have to give you a less-than-perfect grade if you don't do the work. Mostly, I want you to have fun with this useful and beautiful material.

Tentative schedule

Topic 1, Week of Jan 27: Linear algebra, Finite groups and representations

Topic 2, Week of Feb 3: Lie groups and quantum mechanics

Topic 3, Week of Feb 10: isospin, roots and weights and SU(3)

Topic 4, Week of Feb 17: simple roots and more SU(3)

Topic 5, Week of Feb 24: Tensor methods and the Gell-Mann-Okubo formula

Topic 6, Week of Mar 2: Young Tableaux and SU(n)

Topic 7, Week of Mar 9: Color and GUTs

Week of Mar 16: Spring Break

Topic 8, Week of Mar 23: The classification theorem
Topic 9, Week of Mar 30: Spinors
Topic 10, Week of Apr 6: $SO(10)$
Topic 11, Week of Apr 13: Beyond
Week of Apr 20: takehome

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