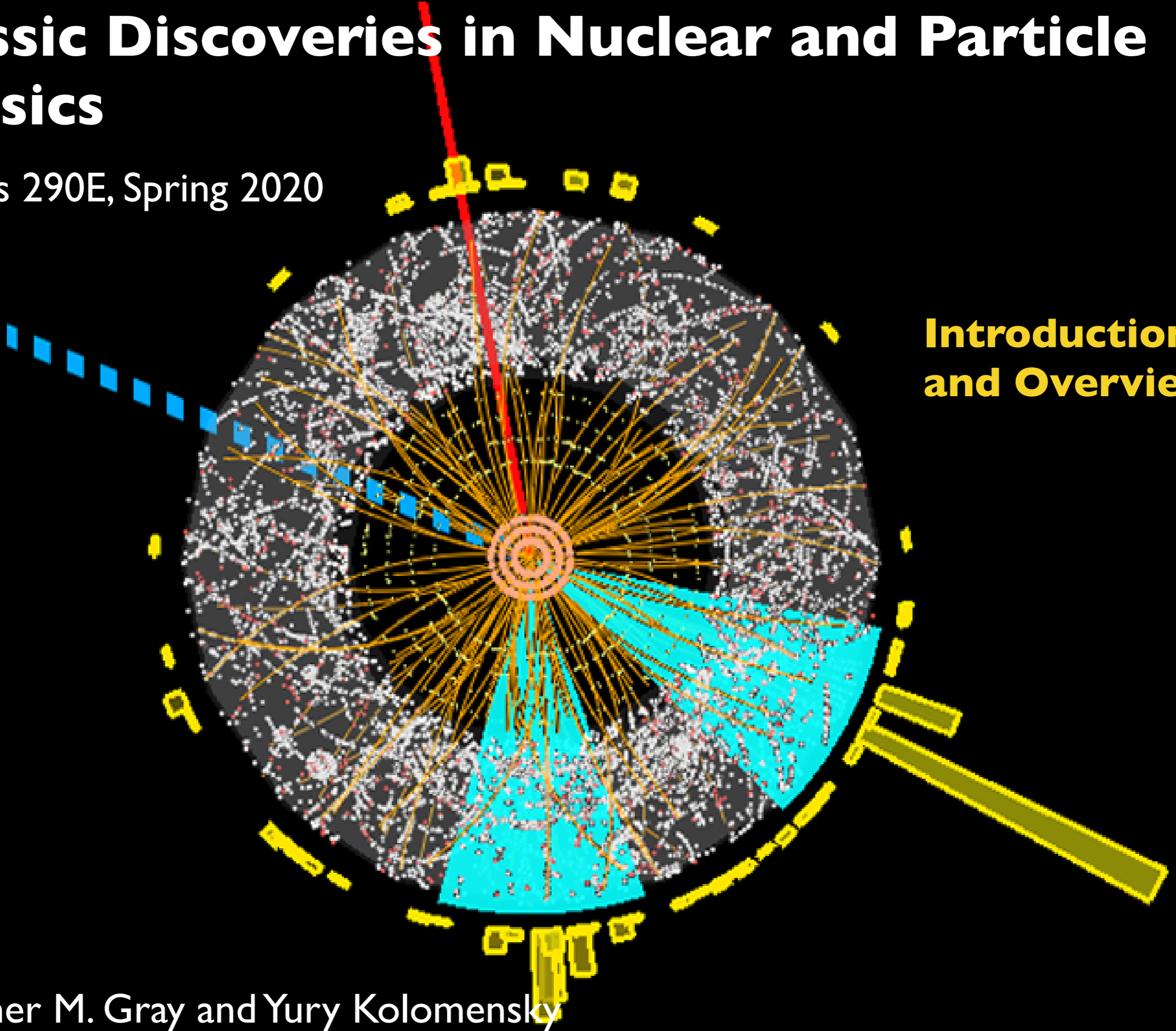


# Classic Discoveries in Nuclear and Particle Physics

Physics 290E, Spring 2020

**Introduction  
and Overview**



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# Welcome to 290E in Spring 2020

- Welcome to this Spring's 290E seminar
- We'll meet on Wednesdays at 4 pm
  - Campus: 468 Birge
  - LBNL: 50B-2222
  - Zoom: <https://berkeley.zoom.us/j/463721662>
- This semester is held every term but with a different topic
  - This semester its “Classic Discoveries in Nuclear and Particle Physics”
  - Format: each week we'll have one or two presentations about the topic for the semester
  - We'll have talks from senior physicists for the first four weeks, then the rest of the semester will be up to you

# Topics

- Basic criteria for topics:
  - Any Nobel prize-winning in particle or nuclear physics discovery
  - Any textbook measurement
- There is a suggested textbook: Goldhaber & Cahn which has many good ideas (and includes the original papers)
- Suggested Topics
- Sign up page

# Some ideas from us

- Discovery of the electron
- Discovery of antimatter
- Discovery of strangeness
- Discovery of the neutrino
- Discovery of the muon
- Discovery of the tau lepton
- Development of the cyclotron (a very Berkeley topic !)
- Discovery of Cherenkov radiation
- Discovery of the weak interaction
- Discovery of the quark model
- Discovery of the charm quark
- Discovery of the bottom quark
- Discovery of the top quark
- Discovery of the gluon
- Discovery of parity violation
- Discovery of CP violation
- Discovery of the W and Z boson
- Discovery of the Higgs boson
- Discovery of neutrino masses and oscillations
- Measurement of the Z width and the number of neutrinos
- Development of the nuclear shell model
- Discovery of transuranium elements

- If you're not sure about which topic to select or if you have any questions, feel free to send us an email
  - Or if you have any questions while you're preparing your presentation
- You're also welcome to suggest your own topic
- Please sign up for topics before class next week
- You should aim for a 30 minute presentation to allow time for questions and discussion
  - The number of slides depends on the slide density and the presenter but a good rule of thumb is 1 minute per slide
  - You can also have a look at the presentations from last semester to get an idea

# Things you may want to include in your talk

- Introduction to the Physics: Always motivate the measurement, concept, or point of the topic you are covering.
- History of the subject or previous measurements. Current status of our knowledge of the subject.
- Or motivate historically, then tell a story about how the measurement or discovery unfolded.
- Discuss the location, detector, facility, or other relevant details about the measurement(s) you are talking about.
- Talk about the measurement technique.
- Expected sensitivity (precision) of the measurement, or obtained sensitivity in the case of a discovery (compared to previous). -Always good to compare to other experiments after the same piece of physics, either ones before or to come in the future.
- Talk about how the measurement affected or will affect our knowledge of particle physics: what is the big picture, and the consequences of the discovery or future measurement.
- Always give a summary and conclusion. You don't have to call it that, but make sure you cover the points.
- Look to the future and discuss future prospects of the experiment(s) you are talking about, or other experiments as stated above, if that is what is **relevant**.