

# Relativistic Quantum Field Theory I

Physics 7651

**Time:** Tuesday, Thursday 2<sup>55</sup>-4<sup>10</sup> pm, location: Rockefeller 132.

**Lecturer:** Csaba Csáki, 469 Physical Sciences Building, 4-8935, [csaki@cornell.edu](mailto:csaki@cornell.edu)

**Content:** This is the first semester class in quantum field theory geared towards physics graduate students. We are planning to cover the following topics:

- Free spin-0 fields (Canonical quantization, causality, symmetries)
- Interacting spin-0 fields (S-matrix, Feynman rules, unitarity, renormalization, spectral decomposition)
- Spin-1/2 fields (Lorentz and Poincaré groups, Weyl fermions, Dirac fermions, quantization and renormalization of spinors)
- If we have time we will do path integrals/and or basics of scattering amplitudes.

**Textbooks:** We will use the lecture notes by John Preskill <http://www.theory.caltech.edu/~preskill/notes.html> and also by Sidney Coleman. The nominal textbook is Peskin and Schroeder: An Introduction to Quantum Field Theory. Other good books include Schwartz, Zee, Srednicki, and the more encyclopedic Weinberg books.

**Prerequisites:** Advanced quantum mechanics, some knowledge of special relativity.

**Course requirements:** There will be weekly problem sets, about 13 sets in total. Problem sets will be posted on Thursdays and will be due in class the next Thursday. There will be a short take-home final in early December.

**Grades:** The final grade will be determined by  $0.75 \times \text{homework} + 0.25 \times \text{final}$ . Undergraduates must take this class for a letter grade. Grad students may opt for pass/fail, but prospective particle theorists are recommended to sign up for a letter grade. To pass you need to get to the level of the letter grade C (around 50% of total weighted points).

**Office hour:** Thursday 4:30-5:30pm, PSB 469.

**Grader:** Guglielmo Papiri ([gp343@cornell.edu](mailto:gp343@cornell.edu)). Guglielmo will hold a homework session/office hour Wednesdays 4-5pm, in PSB 470.

**Website:** [canvas.cornell.edu](http://canvas.cornell.edu), all enrolled students should be automatically enrolled into the Canvas site. I have also enabled discussion there, let's try to see how if that works for homework related discussions.