Relativistic Quantum Field Theory I

Physics 7651

Time: Tuesday, Thursday 2^{55}-4^{10} pm, location: Rockefeller 231.

Lecturer: Csaba Csáki, 469 Physical Sciences Building, 4-8935, 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)

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 December.

Grades: The final grade will be determined by 0.75×homework+0.25×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: Larissa Kiriliuk lk559@cornell.edu. There will be a homework session/office hour Wednesdays 4-5:30pm, in PSB 470. The homework sessions will be held jointly by Larissa and Qianchi Liu ql248@cornell.edu. There will also be one additional office hour by them to be discussed.

Website: canvas.cornell.edu, all enrolled students should be automatically enrolled into the Canvas site. I have also enabled discussion there, let's try to use that for homework

related discussions.

Travel dates + make-up classes: I will have a few trips during the semester when I will be away. The following dates are sure: September 26, October 17, December 5. There will be one more sometime early November tbd. We will need to schedule 4 make-up classes, proposed: Fridays 4-5:30pm, first on Friday September 20. These make-up lectures will be recorded in case you can't make it.