Quantum Field Theory II (663), Spring 2023

Lectures: Tuesdays and Thursdays from 4:30pm to 5:45pm in Hampton 2107.

Instructor: Martin Kruczenski, e-mail:markru@purdue.edu, office: PHYS274.

T.A.: Uday Sood email: usood@purdue.edu (Office hours by appointment and online or by email).

Textbook: "An Introduction to Quantum Field Theory" by M. Peskin and D. Schroeder. Lecture notes can be downloaded from the course webpage as the course progresses. Many good books are available and contain the same material. I recommend Cheng & Li in particular.

Course Webpage: `http://web.ics.purdue.edu/~markru/`

Homework: Homework will be given every other week. The deadline is one week after the problems are given.

Exams: No exams.

Final grading: Final grade is based on the homework problems given along the course.

Contents of the course

We'll go over part III of the book including the following topics:

Abelian and Non-abelian gauge fields Classical action, non-abelian groups. Quantization of gauge fields (path integrals and BRST method). Strong and electroweak interactions as gauge theories. (Ch. 15, 16, 17, 20)

Renormalization of gauge theories Renormalizability of gauge theories including spontaneously symmetry breaking case. Beta function. (Ch. 16, 21)

Scattering Scattering amplitudes, analyticity, crossing and unitarity. Optical theorem, Froissart bound. (Ch. 7, 18, A.5)

Conformal theories Conformal symmetry in 3 and 4 dimensions. Bootstrap methods.