

Syllabus

Course name: Quantum Field Theory II (PHYS130106.01)

Instructor: Satoshi Nawata, Physics S422, Jiangwan snawata@fudan.edu.cn

Teaching Assistant: Hao Wang, 19110190011@fudan.edu.cn

Hours: Monday 13:30 – 16:10

Place: Bilibili

Office hour: Whenever, but email me.

Prerequisites: Quantum Field Theory I, Quantum mechanics, Electrodynamics, Classical Mechanics

About the course:

Based on what we have learned in QFTI in Fall 2019, we will continue to learn new concepts and techniques of quantum field theory. We will study renormalization group flow, beta-functions, and Wilsonian effective action. In addition, we introduce to quantization of non-Abelian gauge theories and spontaneously symmetry breaking. With these preparations, we will understand how QFT can describe the Higgs mechanism and the Standard Model of particle physics. If time permits, we will learn anomaly and some aspects of QCD.

We will start from chapter 9 of Peskin and Schroeder, and will cover selected (not all) chapters.

Due to the outbreak, we will do live streaming at <https://live.bilibili.com/21873644> during 13:30 – 16:10, Monday. All the recorded videos will be uploaded to the account of the TA, Wang Hao.

Main content:

- Path integral formulation
- General aspects of renormalization
- Wilsonian renormalization group flow
- Quantization of Yang-Mill theory
- Spontaneously symmetry breaking
- Higgs mechanism and the Standard Model of particle physics
- Some other advanced topics

Main textbook:

An Introduction to Quantum Field Theory. Michael E. Peskin, Daniel V. Schroeder

Supplementary textbooks:

Quantum Field Theory, Mark Srednicki

Quantum field theory and the standard model, Matthew Dean Schwartz.

The Quantum Theory of Field, Steven Weinberg

Grade evaluation: Grade will be determined based on homework sets (60%) given every other week and the final test (40%).