

# Topics in Many-Body Physics and Random Matrix Theory

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## Syllabus

**Course Time:** Tuesday-Thursday, 11.30-12.50

**Class Room:** P117

**Grading:** Student will be asked to teach one or two lectures (depending on the size of the class) on a topic from a list of topics related to the subject of the class. There will be no formal homework. However, I will regularly ask you to complete derivations I omitted during the lecture.

**Office Hours:** You are welcome in my office at any time.

During the past decades, there have been a great deal of developments in quantum-many body theory, in particular in relation to chaos. We will discuss some of these topics such as for example, many-body quantum chaos, many-body localization, entanglement entropy and eigenstate thermalization. I will illustrate these concepts with the Sachdev-Ye-Kitaev (SYK) model which is a many-body random matrix theory. We will start this lecture with an introduction to random matrix theory and the SYK model. Connections with two-dimensional quantum gravity will be made as well.

There are no textbooks that cover the material of my lecture. However, I will give ample references and my notes will be essentially self-contained.