

# Topics in Quantum Many-Body Chaos and Random Matrix Theory (PHY684)

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First Meeting: Tuesday, August 27th, 11.20 a.m. in P117

The main topic of this special topics lecture are Quantum Many-Body Theory and Random Matrix Theory.

## I. Random Matrix Theory

1. Spectra of complex systems
2. Statistical theory of spectra
3. Random matrix ensembles
4. Orthogonal polynomials
5. Universality

## II. Concepts in Many-Body Quantum Theory

1. Entanglement entropy
2. Many-body localization
3. Eigenstate thermalization
4. Out-of-time-order correlators
5. Thermalization

## III. The Sachev-Ye-Kitaev Model

1. Path integral formulation
2. Moment method
3. Q-Hermite polynomials
4. Out-of-time-order correlator
5. Liouville theory

## IV. Connections with Quantum Gravity

1. Spectra of compound nuclei and black holes
2. Jackiw-Teitelboim gravity
3. Saad-Shenker-Stanford theory

The time spend on each of the topics depends on their significance and on the interest of the students. Additional suggestions are welcome

Looking forward to see you during the first meeting!