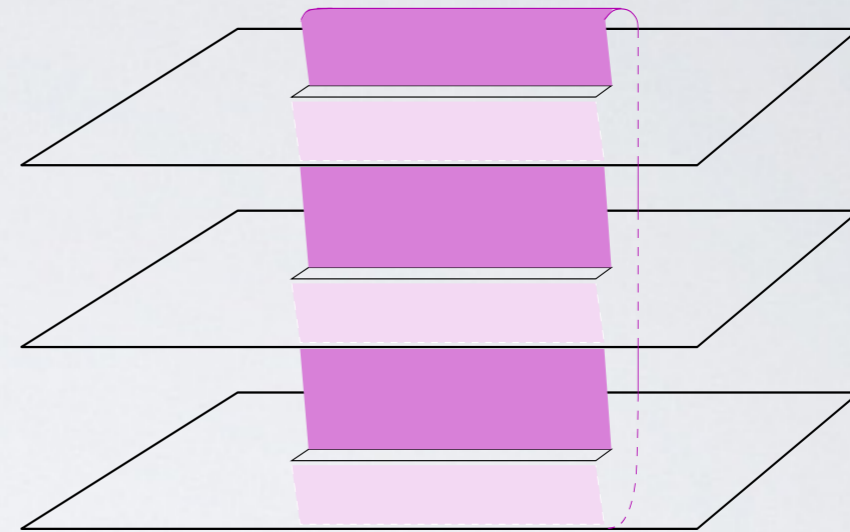


# CONFORMAL FIELD THEORY AND APPLICATIONS (PHYS 720)

Spring 2016

A large variety of problems in modern physics –ranging from the most theoretical (string theory) to many aspects of condensed matter physics (spin chains, quantum wires), and issues of quantum information (entanglement, Loschmidt echo) – involve **conformal invariant field theories in 2 dimensions**. The systematic use of the conformal symmetry has led to incredible progress in the understanding of these theories, while furthering deep links with mathematics, in particular the theory of infinite dimensional Lie algebras.

The purpose of this class is to give a general, **down to earth** introduction to the topic. I will start with a thorough discussion of **bosonization**, and insist on qualitative, physical aspects of conformal invariance, with only minimal emphasis on the general formalism. I will also spend quite a bit of time discussing applications. These will include aspects of quantum impurity problems – such as ‘Anderson orthogonality’ and the Kondo effect, or entanglement and Loschmidt echo in – possibly quenched – quantum spin chains. While the technical level will be kept rather elementary, a solid first year graduate knowledge of statistical mechanics and quantum mechanics will be assumed.



The Riemann surface involved in the calculation of the entanglement entropy of a segment with the rest of a 1 dim. chain.

## Scheduling:

The class will follow an intense schedule of two 3-hour meetings per week. We will start on January 19th and end on March 31st, 2016. The time will be 3.30 to 6.20 pm on Tuesday and Thursday in SOS B43. For further information contact Prof. H. Saleur: [saleur@usc.edu](mailto:saleur@usc.edu)