Conformally Invariant Stochastic Processes

S. Rohde, University of Washington

The last decade has produced spectacular results regarding 2d statistical physics models at criticality. In this mini-course, we will give an introduction to this emerging field of "Random Geometry". Topics covered:

1. We will begin by discussing discrete lattice processes (such as Loop Erased Random Walks, Uniform Spanning Trees, Self-Avoiding Walks, percolation, the Ising model, the FK-model, DLA) and the domain Markov property.

2. We will then discuss the definition and basic properties of the Schramm-Loewner Evolution SLE, such as phase transitions and trace continuity.

3. After introducing models of random maps (particularly uniform random triangulations of the sphere, the UIPT as their local limit, and the Brownian map as the scaling limit), we will conclude by discussing conformal representations of planar maps, particularly via circle packings and via Riemann surfaces. If time allows, we will discuss recurrence of the Simple Random Walk and of Brownian motion on the UIPT.

Meeting **dates and times:**

Wed Oct. 15, 10:15 - 11:45
Tue Oct. 21, 12:15 - 13:45
Fri Oct. 31, 10:15 - 11:45
Wed Nov. 5, 10:15 - 11:45
Wed Nov. 12, 10:15 - 11:45
Wed Nov. 26, 10:15 - 11:45
Wed Dec. 3, 10:15 - 11:45
Wed Dec. 10, 10:15 - 11:45

Literature: The material for 1. and 2. (and much more) can be found in the overview article "A Guide to Stochastic Loewner Evolution and its Applications" by Kager and Nienhuis, the book "Conformally Invariant Processes in the Plane" by Greg Lawler, and the book "Probability on Graphs" by Geoffrey Grimmett. Parts of the material for 3. can be found in the lecture notes "Scaling limits of random trees and planar maps" by Jean-Francois Le Gall and Grégory Miermont.