New Directions Lecture Series

**Speaker:** Olivier Bernardi  
**Dates:** November 6 & November 13, 4 pm; tea in Room 101 at 3:30.  
**Room:** 317 Goldsmith Hall

Lecture 1 (November 6): Bijections for planar maps.  

**Abstract:** A map is a decomposition of a 2-dimensional surface into polygons. Maps appear naturally in a variety of mathematical contexts, including random matrices, random surfaces and the symmetric group. In recent years, many beautiful results have been obtained for maps using bijections between maps and simpler objects, typically trees. During these two talks I will give an introduction to maps and give some motivation for studying maps.

In the first talk, I will give an overview of bijections for planar maps (decomposition of the sphere into polygons). These bijections associate a decorated tree to each planar map, and allows one to translate problems about maps into problems about trees. As we will see, these bijections all have a common ancestor: a master bijection for planar maps (joint work with Eric Fusy).

In the second talk, I will talk about random surfaces and random lattices. I will first give a brief account of the great results due to Le Gall and Miermont about the random surfaces (seen as metric spaces) obtained as limits of random planar maps. Then I will discuss the relevance of doing statistical mechanics on “random lattices”, that is, random maps. In particular, we will consider percolation on triangulations (joint work with Nicolas Curien and Gregory Miermont).

**About the series:** The New Directions Lecture Series is a series of lectures or mini-courses offered in the fall semester of each year. They are given by faculty members and are designed to introduce students to a current area of research in more depth than is possible in a single seminar lecture. Second-year students are especially encouraged to attend this seminar, as it offers them an opportunity to learn about the research interests of faculty members.