EVERYTOPIC SEMINAR
Friday October 16, 2.00-3.20pm in Goldsmith 226

Gaetan Borot (MIT/ MPIM Bonn):
Counting surfaces and abstractly related problems

The problem of enumerating discrete orientable surfaces has been introduced by Tutte in the 60s, in his famous “Census” paper. Although Tutte restricted to specific models of planar maps made of polygons, his techniques can be generalized to obtain functional relations between generating series of maps in all topologies, and also for maps carrying a configuration of standard statistical physics model (Ising, self-avoiding loops, Potts, ...).

Solving explicitly those equations is in general very hard for planar maps (i.e. genus 0) with 1 boundary (disks) and 2 boundaries (cylinders). But, once those generating series are known, one can obtain the generating series for all other topologies by a recursion on the Euler characteristics. This recursion takes a universal form, called ”topological recursion”, and is relevant to solve other problems, involving enumerative geometry (I will say a word on ”counting continuous surfaces”) or not (like asymptotic questions in random matrix theory).

A key step to arrive to the solution of Tutte’s equation by the topological recursion is the study of the analytic properties of the generating series of maps, and especially of planar maps with 1 boundary. This also allows a discussion about the way to extract the number of large maps from the solution of the counting problem, via singularity theory. The slogan of this talk will be that the hard part in many ”higher genus” questions actually lies in the ”genus 0” aspects.