Abstract Gaetan Borot

Topological and geometric recursion

In the first lecture, we will follow what I believe is the shortest route to define the topological recursion: following an approach of Kontsevich and Soibelman, it realizes a procedure of quantization of quadratic Lagrangians in symplectic vector spaces (but we will prior to that make a presentation without any reference to geometry !). We will then see the first examples of applications to 2d topological quantum field theories and cohomological field theories.

In practice, the topological recursion computes some formal series (which we call TR amplitudes). In applications, the TR amplitudes often receive a meaning in enumerative geometry of surfaces. TR itself is defined by an induction which is reminiscent to the recursive construction of surfaces by glueing pairs of pants.

This relation to 2d topology is not artificial, as we will see in the 2nd lecture. I will refine the formalism of TR to a formalism called "geometric recursion" (GR), which produces by recursive glueing of embedded pairs of pants functorial assignments for surfaces. We will see a few examples of this setting and explain how it "projects" to TR.

The exercise session will be the occasion of performing some computations with TR and GR.