

Séminaire d'algèbre, topologie et géométrie

Jeudi 29 juin à 14h

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Topological Fukaya categories of surfaces

The Homological Mirror Symmetry (HMS) conjecture was posed by Maxim Kontsevich at the ICM in 1994. It has since driven research within areas of Geometry, Algebra and Analysis. HMS is a homological version (an equivalence at the level of categories) of the phenomenon of Mirror Symmetry observed first by Physicists studying String Theory. This Mirror Symmetry serves as an unexpected bridge between the complex geometry of a manifold X and the symplectic geometry of its mirror manifold X^V . Fukaya categories, constructed in the works of Kenji Fukaya and collaborators, are fairly complicated entities which constitute the A-side (or the symplectic side) of the HMS conjecture.

This talk will be dedicated to the (down to earth) Fukaya category of a surface of higher genus and is based on joint work with Christian Blanchet. We will give an intrinsic topological model for the Fukaya category of a Riemann surface disregarding the area form (and hence its symplectic structure) and compute its Grothendieck group using merely the geometry and topology of curves on surfaces. If time permits, we shall talk about the graded version of this story. That is, try to give an intrinsic model for \mathbb{Z} -graded objects and morphisms in lieu of the general setup of Seidel's, following the one proposed by Kontsevich, in a topological setting. This is work in progress.