IMUB Institut de Matemàtica

Lectures on Gromov–Witten Invariants

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Lectures:

1. *Gromov–Witten Invariants and Quantum Cohomology*
   This is an introduction to descendant Gromov–Witten invariants for compact symplectic manifolds. Genus-zero Gromov–Witten invariants can be used to define quantum cohomology both on the small phase space and the big phase space. They also define a Frobenius manifold structure on the space of cohomology classes. The structure of genus-zero invariants is important in the study of higher genus invariants.

2. *Virasoro Conjecture for Gromov–Witten Invariants*
   The Virasoro conjecture predicts that generating functions for Gromov–Witten invariants of smooth projective varieties are annihilated by an infinite sequence of differential operators which form a half branch of the Virasoro algebra. This conjecture was first made by physicists Eguchi, Hori, and Xiong, and modified by S. Katz. When the manifold is a point, it is equivalent to Witten's conjecture, proved by Kontsevich, which says that the generating function of intersection numbers on moduli spaces of curves is a tau function of the KdV hierarchy. The Virasoro conjecture for compact symplectic manifolds is a very powerful tool in computing Gromov–Witten invariants.

3. *Moduli Spaces of Curves and Universal Equations*
   Moduli spaces of stable curves are compatifications of moduli spaces of Riemann surfaces with marked points. These spaces were introduced by Deligne and Mumford in the 1960's. Many properties of Gromov–Witten invariants are rooted in moduli spaces of curves. In particular, relations in the tautological ring of moduli spaces of curves induce differential equations for generating functions of Gromov–Witten invariants for compact symplectic manifolds. Such equations are called universal equations. These equations reflect more basic properties of Gromov–Witten invariants than Virasoro constraints.

Place: Aula T1, Facultat de Matemàtiques, UB
Time: 15.30 – 16.30

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