Symplectic Topology (L24)

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The study of symplectic manifolds originated as an extension of classical mechanics; it has since developed into a field of its own right, with connections to e.g. low-dimensional topology, algebraic geometry, and theoretical physics. The course will focus on the core foundations of symplectic topology, with an emphasis on explicit geometric techniques and examples, and end with an introduction to $J$-holomorphic curves, which are at the heart of modern symplectic topology.

Time allowing, topics are expected to include:

- Symplectic circle actions and moment maps, symplectic reduction.
- Surgery constructions: blow ups, symplectic fibre sums. Lefschetz pencils. Gompf’s theorem on fundamental groups of symplectic 4-manifolds.
- Almost complex structures and compatible triples. Some properties of Kaehler manifolds.

Pre-requisites

Essential: Algebraic Topology and Differential Geometry, at the level of the Part III Michaelmas courses. Basic concepts from Algebraic Geometry (at the level of the Part II course) will be useful.

Literature


Additional support

Four examples sheets will be provided and four associated examples classes will be given. There will be a one-hour revision class in the Easter Term.