

Generalizing symplectic topology from 1 to 2 dimensions

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In symplectic topology one uses elliptic methods to prove rigidity results about symplectic manifolds and solutions of Hamiltonian equations on them, where the most basic example is given by geodesics on Riemannian manifolds. Harmonic maps are the natural 2-dimensional generalizations of geodesics.

In this talk we introduce what generalization of symplectic structures a manifold needs to have in order to generalize these elliptic methods to the study of 2-dimensional objects. Our approach provides a surprising connection between so-called polysymplectic geometry and holomorphic symplectic geometry. Both the Arnold conjecture and Gromov's non-squeezing theorem can be generalized to this setting.