Topics in Symplectic Dynamics
Hauptseminar
Prof. Peter Albers

Holomorphic Curves in Low Dimensions

From Symplectic Ruled Surfaces to Planar Contact Manifolds

Description

Since the ground-breaking work of Gromov in 1985 [1], holomorphic curves have been a central tool in studying symplectic manifolds (M, ω), as illustrated in the comprehensive monograph [3]. When the manifold has dimension four, the interplay between holomorphic curves and the homological intersection product $H_2(M;\mathbb{Z}) \times H_2(M;\mathbb{Z}) \to H_2(M;\mathbb{Z})$ lead to surprising rigidity results.
After giving the basics of the theory of holomorphic curves, the goal of our seminar will be to present some of these results and, most notably, a theorem of McDuff [2] of 1990, which asserts that a symplectic manifold of dimension 4 which contains a holomorphic sphere with positive self-intersection is either $\mathbb{CP}^2$ or the blow-up of a ruled symplectic manifold. We will follow a modern perspective on the subject, as presented in the recent book [4] by Chris Wendl.

Everybody is welcome to attend!

Time: Wednesday 14:15 - 15:45. First meeting on April 24.

Room: SR4 – MATHEMATIKON, INF 205.

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References

[1] M. Gromov, *Pseudo holomorphic curves in symplectic manifolds*, Invent. Math. **82** (1985), no. 2, 307–347.

[2] D. McDuff, *The structure of rational and ruled symplectic* 4*-manifolds*, J. Amer. Math. Soc. **3** (1990), no. 3, 679–712.

[3] D. McDuff and D. Salamon, *J-holomorphic curves and symplectic topology*, second ed., American Mathematical Society Colloquium Publications, vol. 52, American Mathematical Society, Providence, RI, 2012.

[4] C. Wendl, *Holomorphic curves in low dimensions. From symplectic ruled surfaces to planar contact manifolds*, Lecture Notes in Mathematics, vol. 2216, Springer, Cham, 2018.