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Abstracts of Plenary and Invited Lectures

Section:

6. Topology

1991 MS Classification: 53, 58

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The Geometry of the Seiberg-Witten Invariants.

Fix an oriented, Riemannian 4-manifold X with a $\mathrm{Spin}^{\mathbb{C}}$ structure. (The set of $\mathrm{Spin}^{\mathbb{C}}$ structures is a canonical affine space for the second cohomology.)The Seiberg-Witten equations constitute a canonical system of differential equations on X. If X is compact and has non-negative definite intersection form, an algebraic count of the solutions gives a differential invariant of X. (Witten conjectured that these invariants reproduce the Donaldson invariants.) If X is symplectic, these invariants can be computed by an algebraic count of pseudo-holomorphic submanifolds. When X is not symplectic, the metric still provides a self-dual, harmonic 2-form. This form is symplectic away from its zero set, Z. And, the Seiberg-Witten invariants count certain pseudo-holomorphic submanifolds in $X - Z$ with boundary Z.

References: C. H. Taubes, The Seiberg-Witten and the Gromov invariants, *Math. Res. Letters* **2** (1995), 221–238; C. H. Taubes, Seiberg-Witten invariants and pseudo-holomorphic subvarieties for self-dual, harmonic 2-forms, preprint 1998.