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Fachbereich C, Mathematik und Naturwissenschaften

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The Complex Analysis group from the University of Wuppertal organizes a mini-course on Almost Complex Analysis consisting (preliminary) of 10 lectures of 90 minutes each, given by Prof. Sukhov (Lille) starting from Monday 12.01.2015.

Pseudo-holomorphic curves in Several Complex Variables

(Prof. Alexandre Sukhov, Université des Sciences et Technologies de Lille)

starting **Monday, 12 January 2015, at 4 pm c.t. in room D.13.11**.

The precise schedule of the subsequent lectures will be determined on the first meeting.

Abstract: This series of lectures is an introduction to the seminal Gromov's paper (1985), which employed complex analysis methods in the symplectic topology. Gromov's work had a strong impact both on the symplectic and complex geometry. The present lectures are mainly addressed to specialists in Several Complex Variables. I am going to cover the following topics:

1. Almost complex structures and pseudo-holomorphic curves: local existence, regularity, integrability.
2. Plurisubharmonic functions on almost complex manifolds. Levi form, adapted coordinates, regularization, exhaustion functions, Stein structures, Levi-flat objects.
3. Deformation theory. Local properties of pseudo-holomorphic curves. Linearization of Cauchy–Riemann equations and Beltrami type equation for vector-valued functions. Whitney type theorems. Intersection indices.
4. Gromov's compactness. Symplectic and almost complex structures: interaction. Area and energy. Gromov–Schwarz lemma. Gromov-Riemann removable singularities theorem. Renormalization. Bubbles and Gromov's convergence.
5. Gluing holomorphic discs to Lagrangian manifolds. Filling Lagrangian 2-tori by Levi-flat hypersurfaces. Higher dimensional case: Sard–Smale theory, moduli spaces and non-linear Fredholm alternative. Gluing discs to n-dimensional tori. Application: Gromov's symplectic non-squeezing theorem. Application: gluing a disc to compact Lagrangian manifold and Arnold's conjecture.
6. Filling 2-spheres by discs. We apply Gromov's theory in order to prove Bedford–Gaveau–Klingenberg type theorems in the almost complex setting.