



Workshop on Contact and CR Geometry

Friday, 28 November, 2014

Room 210, Run Run Shaw Building, HKU

10:30 – 11:30 **Jih-Hsin Cheng** (Academia Sinica, Taipei)

A positive mass theorem in three-dimensional CR geometry

Abstract: We define an ADM-like mass, called p -mass, for an asymptotically flat pseudohermitian manifold. The p -mass for the blow-up of a compact pseudohermitian manifold (with no boundary) is identified with the first nontrivial coefficient in the expansion of the Green function for the CR Laplacian. We deduce an integral formula for the p -mass, and we reduce its positivity to a solution of Kohn's equation. We prove that the p -mass is non-negative for (blow-ups of) compact 3-manifolds of positive Tanaka-Webster class and with non-negative CR Paneitz operator. Under these assumptions, we also characterize the zero mass case as the standard three dimensional CR sphere. We then show the existence of (non-embeddable) CR 3-manifolds having nonpositive Paneitz operator or negative p -mass through a second variation formula. Finally, we apply our main result to find solutions of the CR Yamabe problem with minimal energy. This is joint work with Andrea Malchiodi and Paul Yang.

Coffee / Tea Break

11:45 – 12:45 **Po Lam Yung** (The Chinese University of Hong Kong, Hong Kong)

The tangential Kohn Laplacian via conformal equivalence

Abstract: In a recent preprint, Jih-Hsin Cheng, Andrea Malchiodi and Paul Yang have formulated a positive mass theorem in 3-dimensional CR geometry, and reduced its proof to the solution of a tangential Kohn Laplacian on a special class of non-compact strongly pseudoconvex CR manifolds. In joint work with Chin-Yu Hsiao, we established the solution of such Kohn Laplacians, thereby completing their program. We will survey some of these developments in this talk, and highlight the role of conformal equivalence in this regard.

Lunch Break

15:00 – 16:00 **River Chiang** (National Cheng Kung University, Tainan)

Fractional twists and invariant contact structures

Abstract: In this talk, I will introduce a special type of symplectomorphisms called fractional twists. As monodromy, they produce open books with contact structures that are invariant under a circle action. I will then discuss the fillability of these open books. This is a joint work with F. Ding and O. van Koert.

Workshop Dinner

Organizer: Siye Wu