



*Institute of Mathematical Research  
Department of Mathematics*

## **GEOMETRY SEMINAR**

**February 21, 2017 (Tuesday)**

**Room 210, Run Run Shaw Bldg., HKU**

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**Professor Daniele Sepe**

Universidade Federal Fluminense, Brasil

*Symplectic : Contact = Poisson : Jacobi = Affine : Projective*

**3:00 - 4:00pm**

Just as symplectic geometry can be viewed as the non-degenerate case of Poisson geometry, so can contact geometry be viewed as (one of) the non-degenerate case(s) of Jacobi geometry, which, in itself, is a generalisation of Poisson geometry. Moreover, the relation between symplectic and contact geometry can be extended to a relation between Poisson and Jacobi geometry (e.g. symplectisation becomes Poissonisation). Slightly less well-known are the correspondences between symplectic and affine geometry, and between contact and projective geometry. Recently, the works of Crainic, Fernandes and Martinez-Torres on Poisson manifolds of compact types has brought to the fore a deep relation between Poisson and affine geometry. The aim of this talk is to provide a series of (simple!) observations to indicate that all these relations can be viewed as manifestations of a single phenomena which relates symplectic, Poisson and affine geometry (all of which are related to one another!), to contact, Jacobi and projective geometry (again, all related to one another!). This is an ongoing joint project with M.A. Salazar.

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4:00 - 4:15pm

*Tea Break*

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**Professor Maria Amelia Salazar**

IMPA, Brasil

*An explicit integration of Lie algebroids*

**4:15 - 5:15pm**

Interesting geometric structures like Poisson and Jacobi manifolds, can be encoded using Lie algebroids together with a compatible tensor, called Spencer operators. For these type of geometries one can look for desingularisations. This bring us back to the question of understanding the linearization of multiplicative forms on groupoids and the corresponding integrability problem. In this talk I will explain how we can explicitly construct the integration of a Lie algebroid to local Lie groupoid, and the integration of a Spencer operator to a multiplicative form. This procedure give us the method to construct the desingularisations that we were looking for: as an example we obtained an explicit construction of symplectic realisations of Poisson manifolds. This is based on ongoing work with Alejandro Cabrera and Ioan Marcut.