Mini-Course on Geometric Analysis & Mathematical Aspects of General Relativity

Topic 1

**Ricci flow on Riemannian manifolds**

Lecturer: Xi-Ping Zhu (Zhongshan University)

Time: Wednesday (8/4, 8/11, 8/18, 8/25) AM 10:30-12:00

Outline: 1. Dynamic Properties of the Ricci flow
2. Reduced volume and monotonicity
3. Ancient kappa-solutions
4. Ricci flow on three manifolds

Topic 2

**Kaehler-Ricci flow and related topics**

Lecturer: Bing-Long Chen (Zhongshan University)

Time: Wednesday (8/4, 8/11, 8/18, 8/25) PM 1:30-3:00

Outline: 1. Long time existence and Harnack inequalities
2. Curvature estimates
3. Uniformization theorems
4. Liouville properties of holomorphic functions

Topic 3

**Mathematical Aspects of GR**

Lecturers: Piotr T. Chrusciel (Faculté des Sciences, Université de Tours)
Jim Isenberg (University of Oregon)

Time: Tuesday (8/17, 8/24) AM 10:30-12:00, 1:30-3:00
Thursday (8/19, 8/26) AM 10:30-12:00, 1:30-3:00

Goal: The goal of the lecture series is to provide an introduction to current research goals, techniques and results in mathematical general relativity. To benefit from the series, then listeners should know differential geometry and a bit of PDE theory.

Lectures: 1. Introduction to General Relativity and Its Initial Value Formulation (JAI)
2. Introduction to Mass (PTC)
3. On Solving the Einstein Constraint Equations I (JAI)
4. Introduction to Lorentz Geometry (PTC)
5. On Solving the Einstein Constraint Equations II (JAI)
6. Splitting Theorems (PTC)
7. Gluing Solutions of the Einstein Constraint Equations (JAI)
8. Positivity of Mass (PTC)

Place: Lecture Room B of National Center for Theoretical Sciences, 4th Floor, The 3rd General Building, National TsingHua University