

# Summer School

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



NCTS

### 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,  
4<sup>th</sup> Floor, The 3<sup>rd</sup> General Building, National TsingHua University

理論中心數學組將為參加學生安排住宿及交通費補助，請於7/20以前聯絡：  
math@cts.nthu.edu.tw 孫小姐 or 余小姐