

# Modern Interactions between Algebra, Geometry and Physics

## Intensive Course

### **Date and Time**

June 14 (Tue), 2016 15:00 - 18:00

June 15 (Wed), 2016 15:00 - 18:00

June 16 (Thu), 2016 15:00 - 18:00

### **Venue**

Kawai Hall, Aobayama Campus, Tohoku University

### **Lecturer**

Prof. Toshiki Mabuchi (Osaka)

### **Language**

Japanese

### **Title and Abstract**

#### **Title**

Existence problem of constant scalar curvature Kähler metrics

#### **Abstract**

In Kähler-Einstein cases, the Yau-Tian-Donaldson Conjecture on the existence of constant scalar curvature Kähler metrics was solved affirmatively by Chen-Donaldson-Sun and Tian. However, if the polarization class is general, the conjecture is still open. The purpose of this course is to discuss this open case of the Yau-Tian-Donaldson Conjecture.

(1), (2) and (3) below will be given in the first lecture, while we discuss (4) and (5) in the second lecture. Finally (6) and (7) will be given in the last lecture.

- (1) Background materials (polarized algebraic manifolds, test configurations, the Chow norm, the Donaldson-Futaki invariant)
- (2) Li-Xu's pathology, K-stability and strong K-stability, The Yau-Tian-Donaldson Conjecture
- (3) Constant scalar curvature Kähler metrics as limits of balanced Kähler metrics. A quantized version of the Yau-Tian-Donaldson Conjecture
- (4) The Yau-Tian-Zelditch-Catlin expansion for the asymptotic Bergman kernel
- (5) Strong K-stability for constant scalar curvature Kähler manifolds
- (6) Geometry of the moduli space of test configurations on a polarized algebraic manifold
- (7) On the existence of constant scalar curvature Kähler metrics for strongly K-stable Kähler manifolds