

THE UNIVERSITY



OF HONG KONG

*Institute of Mathematical Research  
Department of Mathematics*

# Mini-Workshop on Complex Geometry

**January 10, 2013 (Thursday)  
Room 210, Run Run Shaw Building, HKU**

2:00 – 3:00pm	<i>Tower of coverings and complex structures on some real four dimensional manifolds</i> <b>Professor Sai-Kee Yeung</b> (Purdue University, USA)
3:10 – 4:10pm	<i>Effective freeness of adjoint linear systems</i> <b>Dr. Fei Ye</b> (The University of Hong Kong)
Tea-Break	
4:30 – 5:30pm	<i>Discrepancies of 3 dimensional Gorenstein singularities</i> <b>Dr. Rong Du</b> (The University of Hong Kong)

*All are Welcome*

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## Abstracts

### **Dr. Rong Du**

*Discrepancies of 3 dimensional Gorenstein singularities*

We will talk about 3 dimensional canonical Gorenstein singularities and their discrepancies. As a result, we will show that some invariant is strictly positive for every 3 dimensional canonical Gorenstein singularity and the vanishing of this invariant gives the interior regularity of the Harvey-Lawson solution to the real 5 dimensional complex Plateau problem.

### **Dr. Fei Ye**

*Effective freeness of adjoint linear systems*

The study of pluricanonical and adjoint linear systems play important roles in birational geometry. For curves and surfaces, their behaviors has been well understood. In higher dimensions, it is still a very active area. Let  $X$  be a smooth projective variety of dimension  $n$  and  $L$  be an ample line bundle on  $X$ . A well-known conjecture of Fujita says that the linear system  $|K_X + mL|$  is base point free for  $m \geq n + 1$ . The conjecture is still open for  $n \geq 5$ . However, effective lower bounds for  $m$  have been obtained. In this talk, I will review known results on effective freeness and explain ideas and difficulties towards proving effective freeness results.

### **Professor Sai-Kee Yeung**

*Tower of coverings and complex structures on some real four dimensional manifolds*

It is known through the work of Van de Ven that there are lots of four dimensional real manifolds supporting an almost complex structure but not an integrable complex structures. The goal of the talk is to revisit this type of questions from a different angle by relating to a tower of coverings. As a consequence, given any pair of integers  $(a, b)$  satisfying the Noether relation, there exists an almost complex surface with Chern numbers given by  $c_1^2 = a, c_2 = b$  but supporting no integrable complex structure.