THE UNIVERSITY OF HONG KONG

Institute of Mathematical Research
Department of Mathematics

GEOMETRY SEMINAR

July 24, 2012 (Tuesday)

Rm 210, Run Run Shaw Bldg., HKU

Dr. Fei YE
The University of Hong Kong

Irreducibility of Moduli Spaces of Line Arrangements

2:30 – 3:30pm

Abstract

A hyperplane arrangement is a finite set $\mathcal{A} = \{H_1, H_2, \ldots, H_n\}$ of codimension-one linear subspaces in $\mathbb{CP}^m$ (or $\mathbb{C}^m$). A hyperplane arrangement in a 2-dimensional space is usually called a line arrangement. Associated to a hyperplane arrangement $\mathcal{A}$ in $\mathbb{CP}^m$, there are two main objects, the complement $M(\mathcal{A}) = \mathbb{CP}^m \setminus \bigcup_{H\in\mathcal{A}} H$ and the intersection lattice $L(\mathcal{A})$ which is the set of intersections of hyperplanes in $\mathcal{A}$ equipped with a partial order by reverse inclusion. Questions about a hyperplane arrangement mainly concern geometrical and topological properties of the complement, and how those properties are related to its intersection lattice. A natural question is when the diffeomorphic type of the complement $M(\mathcal{A})$ depends only on $L(\mathcal{A})$. A well-known result says that the complements $M(\mathcal{A}_1)$ and $M(\mathcal{A}_2)$ are diffeomorphic if there is a one-parameter family of arrangements with the same intersection lattice connecting $\mathcal{A}_1$ and $\mathcal{A}_2$. In particular, if $\mathcal{A}_2$ and $\mathcal{A}_2$ are in the same irreducible component of the moduli space, then their complements are diffeomorphic.
This talk will focus on irreducibility of moduli spaces of line arrangements of different combinatorial types, especially, irreducibility of moduli spaces arrangements of 10 lines in $\mathbb{CP}^2$ which is a joint project (in progress) with Meirav Amram, Moshe Cohen and Mina Teicher.

3:30 – 3:45 *Tea Break*

Mr. Yih SUNG
Harvard University

Division Problem and L^2 Cramer's Rule

3:45 – 4:45pm

Abstract

Suppose $f, g_1, \ldots, g_p$ are holomorphic functions over $\Omega \subset \mathbb{C}^n$. Then there raises a natural question: when can we find holomorphic functions $h_1, \ldots, h_p$ such that $f = \sum g_j h_j$? The celebrated Skoda theorem solves this question and gives a L^2 sufficient condition. In general, we can consider the vector bundle case, i.e. to determine the sufficient condition of solving $f_i(x) = \sum g_{ij}(x) h_j(x)$ with parameter $x \in \Omega$. Since the problem is related to solving linear equations, the answer naturally connects to the Cramer's rule.

All are welcome