SATURDAY COLLOQUIA IN
ALGEBRAIC GEOMETRY
DEPARTMENT OF MATHEMATICS
UNIVERSITY OF PITTSBURGH
SATURDAY NOVEMBER 19, 2005
703 THACKERAY HALL

KEN CHUANG
UNIVERSITY OF PITTSBURGH

TITLE: YANG-MILLS, HOPF BUNDLES AND ALGEBRAIC CURVES
10:30 A.M.

ABSTRACT: Yang-Mills theory is one of the most active research fields in mathematics nowadays. A very simple model of this theory is the Hopf bundle $\pi : S^3 \to S^2$, and this model can be generalized to a fibre bundle where the base space is an algebraic curve. In this talk, the definition of algebraic curves and the construction of the Hopf bundle $\pi : S^3 \to S^2$ will be introduced. A history of the Yang-Mills theory, and its application to the development of other branches of mathematics, especially those with a close relationship with algebraic geometry, will be briefly summarized.

CHETAN BALWE
UNIVERSITY OF PITTSBURGH

TITLE: A SKETCH OF KODAIRA’S EMBEDDING THEOREM
11:30 A.M.

ABSTRACT: The study of algebraic varieties over the complex numbers is greatly enriched by the use of analytic techniques. Kodaira’s embedding theorem establishes one of the links between analytic geometry and algebraic geometry. It characterizes compact complex manifolds that are projective varieties. This talk is meant to be an introduction to the use of analytic methods in algebraic geometry. I will provide intuitive (i.e. possibly inaccurate but hopefully satisfying!) definitions of the tools from complex differential geometry and algebraic topology. So a major portion of the talk should be accessible to anyone with a basic background in complex analysis and multivariable calculus.
CHRIS JONES
UNIVERSITY OF PITTSBURGH

TITLE: WHAT’S SO GREAT ABOUT MODULI SPACES?
2:00 P.M.

ABSTRACT: Abstract: Moduli spaces arise from the classification of certain types curves
and surfaces. However, their significance transcends their origin. We will be looking at
some key theorems in the study of moduli spaces.

PETER GLENN
CARNEGIE MELLON UNIVERSITY

TITLE: INTRODUCTION TO THE MORDELL-LANG CONJECTURE
3:00 P.M.

ABSTRACT: The Mordell-Lang conjecture in diophantine geometry has had a prolific
history in twentieth century mathematics. Lang gave its present formulation in the 1960s,
based on Mordell’s conjecture of the 1920s and a recent question of Manin and Mumford;
Faltings 1983 proof of the Mordell conjecture earned a Fields medal, and Hrushovski’s 1996
proof of the conjecture for function fields was a surprising application of model theory –
a relatively young, and separate, field – to mainstream mathematics. In this talk we will
motivate the conjecture, beginning with a review of abelian varieties, and then we will
outline Hrushovski’s proof.

JYOTSNA DIDWADKAR
UNIVERSITY OF PITTSBURGH

TITLE: (ALMOST) EVERYTHING YOU ALWAYS WANTED TO KNOW
ABOUT GEOMETRIC REPRESENTATIONS BUT WERE AFRAID TO ASK!
4:00 P.M.

ABSTRACT: The field of p-adic numbers is obtained by completing the rationals with
respect to a non-archimedean absolute value associated to a prime ‘p’. Many recent de-
velopments in number theory have relied crucially on algebraic geometry, p-adic methods
and, in particular, on p-adic representations. Roughly speaking, these are objects that
attach a p-adic vector space to the Galois group of a finite extension of the rational field.

Many examples of p-adic representations arise naturally from geometry. We will discuss
what it means for such a representation to be geometric.