



PURDUE UNIVERSITY

Department of Mathematics Colloquium

Speaker: Professor Gal Binyamini, Weizmann Institute

Title: "The Infinitesimal Hilbert 16th Problem"

Date: Tuesday, August 16, 2011

Time: 4:30 P.M.

Place: WTHR 104

Abstract

The Hilbert 16th problem asks for a finite bound on the number of limitcycles which may appear in a system of polynomial differential equations in the plane, depending solely on the degree. This problem has remained open for over a century. As an intermediate step, one may attempt to study those limit cycles which may arise from an infinitesimal perturbation of a Hamiltonian system. To a large extent, this problem may be reduced to the following one: "How many real zeros may an Abelian integral admit, as a function of its degree?". This problem has come to be known as the Infinitesimal Hilbert 16th problem, and has also remained open for about half a century.

In this talk I will present the infinitesimal Hilbert problem, and describe the first explicit upper bound providing a complete solution (a result of a joint work with Dmitry Novikov and Sergei Yakovenko). I will give an outline of the proof which uses ideas from Algebraic Geometry, Differential Equations and Real Constructive Geometry. If time permits I will discuss some more recent developments.