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# MATHEMATICS DEPARTMENT FIRST RAMANUJAN COLLOQUIUM

by

**Professor Manjul Bhargava \***  
**Princeton University**

on

*Sums of squares and the “290 theorem”*

**Date and Time:** 4:00 - 5:00pm, Monday, March 19, 2007

**Room:** FAB 103

## OPENING REMARKS

by

**George E. Andrews**

**Evan Pugh Professor - Penn. State Univ.**  
**Distinguished Visiting Professor - UF**



**Refreshments:** after the lecture, in Little 339.

### Abstract:

The famous “Four Squares Theorem” of Lagrange asserts that any positive integer can be expressed as the sum of four square numbers. That is, the quadratic form  $a^2 + b^2 + c^2 + d^2$  represents all (positive) integers. When does a general quadratic form represent all integers? When does it represent all odd integers? When does it represent all primes? We show how all these questions turn out to have very simple and surprising answers. In particular, we describe the recent work (joint with Jonathan Hanke, Duke University) in proving Conway’s “290-Conjecture”. This solves a problem of Ramanujan on quadratic forms.

**Note:** The colloquium will be supplemented by three seminars to be given on Tuesday and Wednesday.

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\* Professor Manjul Bhargava, at the young age of 32, is one of the most eminent mathematicians in the world. When appointed as Full Professor of Mathematics at Princeton University at the age of 28, he was the youngest to hold that high rank at Princeton. His phenomenal mathematical career began early and recognitions have come in rapid succession. He was the recipient of the Frank and Bennie Morgan Prize of the American Mathematical Society (AMS) for undergraduate research in 1996. As an undergraduate at Harvard, he was University Salutatorian and winner of the Hoopes Prize. He then went to Princeton University to do his PhD under the direction of Prof. Andrew Wiles of Fermat’s Last Theorem fame. Bhargava wrote a phenomenal PhD thesis in which he obtained path-breaking extensions of Gauss composition law for binary quadratic forms. His thesis was published as four papers in the Annals of Mathematics. For this and other work, he has received the AMS Blumenthal Prize in January 2005, the Clay Mathematics Prize in November 2005, and the First SASTRA Ramanujan Prize in December 2005.