Friday 14 January 2011 at 14:15

Tea before the lecture begins at 13:00

BMS Loft, Urania, An der Urania 17, 10787 Berlin

Jens Funke

(U Durham)

Hecke and Langlands: A little bit of number theory

Erich Hecke   R. P. Langlands

A very classical problem in number theory is 'In how many ways can one write a given integer as the sum of 4 squares?'. A variant of this question is the following. How many integral solutions has the equation

$$2(x^2 + y^2 + u^2 + v^2) + 2xu + xv + yu - 2yv = p$$

for a prime number p? Moreover, if one takes two such quadratic equations in 4 variables, how is their number of solutions related?

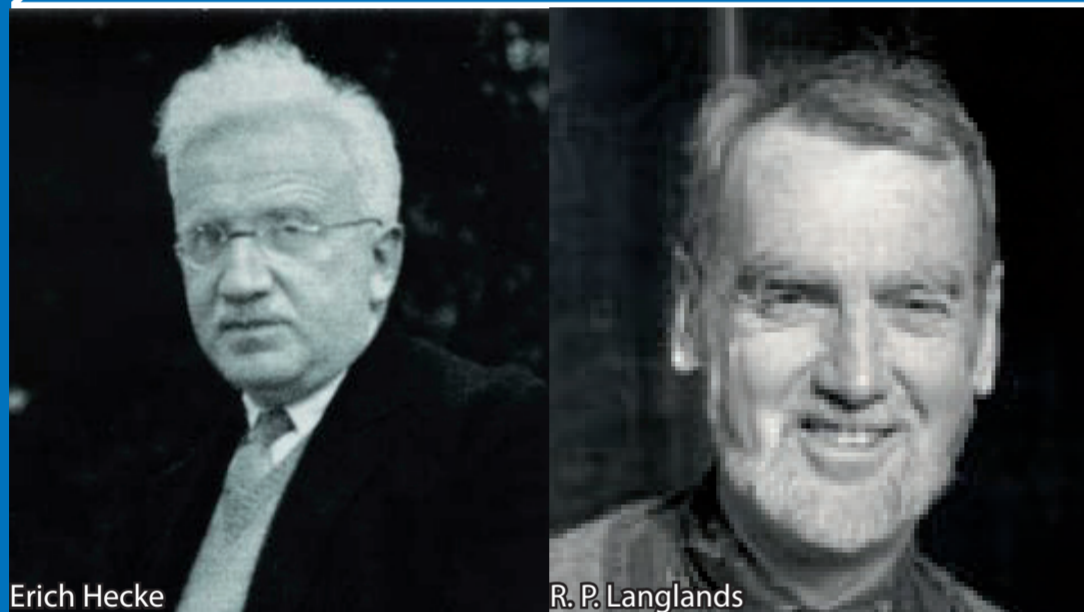On the other hand, consider the cubic equation

$$Y^2 + Y = X^3 - X^2$$

in the X Y - plane. This is an example for an integral elliptic curve. What are the integral or rational solutions for this equation? Or, how many solutions are there modulo a prime p?

Questions over questions. But most astonishingly, these two seemingly completely different equations are in fact closely related!

In this talk Jens Funke outlines how the explanation of such a relationship leads naturally to questions in modern number theory. In particular, he will outline the role of the classical theory of modular forms as developed by Hecke. This offers a glimpse of the imminent Langlands program, which asserts far reaching generalizations of the examples presented in this talk.

Jens Funke obtained his PhD in 1999 at the University of Maryland. After postdoctoral stays in Indiana, Bonn, Barcelona, and Toronto, he taught from 2003 to 2007 at New Mexico State University. Since 2007 he teaches and conducts research at the University of Durham, England.

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