

Spring lectures in algebraic geometry: p -adic Hodge theory

Peter Scholze

Abstracts

Lecture 1. After giving a general introduction to classical complex Hodge theory from the point of view of an algebraic geometer, and its significance in arithmetic geometry, we will try to give an idea of what p -adic Hodge theory is, and why it is a powerful tool for arithmetic problems.

Lecture 2. In this talk, we want to explain the p -adic analogues of the basic statements of Hodge theory, e.g. that singular, de Rham, and Hodge cohomology all have the same dimension. We will try to give an impression of the methods used to prove these assertions.

Lecture 3. The final talk will be about recent work with Bhargav Bhatt and Matthew Morrow, on integral p -adic Hodge theory. The key innovation is the definition of a new cohomology theory for p -adic schemes, which can be regarded as a (canonical!) q -deformation of de Rham cohomology.