

## Cohomology of arithmetic groups, periods and special values

I will give an general scenic view of the cohomology of arithmetic groups. These cohomology groups  $H^\bullet(S, \mathcal{M})$  come with an algebra of endomorphisms  $\mathcal{H}$ , the Hecke algebra. These cohomology groups provide some (absolutely) irreducible modules  $\pi_f$  for the Hecke algebra. To these irreducible Hecke modules  $\pi_f$  we can attach  $L$ -functions  $L(\pi_f, r, s)$ .

*The theme is to investigate to interaction between these  $L$ -functions and the structure of the cohomology as  $\mathcal{H}$ -module.*

A) The analytic behavior of  $L(\pi_f, r, s)$  at certain specific points  $s_0$  (pole or holomorphic) has influence on the structure of the cohomology.

B) The  $\mathbb{Z}$ -structure on the cohomology gives us some implications about special values.

C) The arithmetic (prime factorization) of some special values tells us something about the structure of the integral cohomology (denominators of Eisenstein classes).

I will give some elementary examples.

Two years ago I give a talk at the university of Lille, I wrote a short note, which covers most of the material of these talks and is available on my home page as Talk-Lille.pdf

<http://www.math.uni-bonn.de/people/harder/Manuscripts/Eisenstein/>