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*The pro-p-Iwahori Hecke Ext-algebra of $SL(2, \mathbb{Q}_p)$*

Given a p-adic reductive group G and its (pro-p) Iwahori-Hecke algebra H, we are interested in the link between the category of smooth representations of G and the category of H-modules. When the field of coefficients has characteristic zero this link is well understood by work of Bernstein and Borel.

In characteristic p things are still poorly understood and the role of the pro-p Iwahori-Hecke algebra H is played by a differential graded Hecke algebra. In particular, by work of Peter Schneider, the module category over the d.g. Hecke algebra is equivalent to the derived category of smooth representations of G. Unlike in the case of H, we know little about the structure of this d.g. Hecke algebra.

In this talk I will report on joint work with Peter Schneider where we study the cohomology of the d.g. Hecke algebra. When $G = SL(2, \mathbb{Q}_p)$ we now understand its structure well enough to deduce some properties of mod p representations of $SL(2, \mathbb{Q}_p)$. We also have results for certain more general groups.