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Representations of  $p$ -adic groups and Hecke algebras

Abstract : An explicit understanding of the category of all (smooth, complex) representations of  $p$ -adic groups provides an important tool in the construction of an explicit or categorical local Langlands correspondence. The category of representations of  $p$ -adic groups decomposes into subcategories, called Bernstein blocks, which are indexed by equivalence classes of so called supercuspidal representations of Levi subgroups. In this talk, I will give an overview of what we know about an explicit construction of supercuspidal representations and about the structure of the Bernstein blocks. In particular, I will discuss a joint project in progress with Jeffrey Adler, Manish Mishra and Kazuma Ohara in which we show that general Bernstein blocks are equivalent to much better understood depth-zero Bernstein blocks. This is achieved via an isomorphism of Hecke algebras and allows to reduce a lot problems about the (category of) representations of  $p$ -adic groups to problems about representations of finite groups of Lie type, where answers might already be known or are easier to achieve.