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Recent advances on the Serre weight conjectures

The Langlands reciprocity associates a Galois representation with a certain modular form/automorphic representation. One can ask how this association reflects structures on both sides. For example, the weights of modular forms/automorphic representations are matched by the Hodge-Tate weights of Galois representations. The Serre weight conjectures are mod p analogues of this structural correspondence.

In this talk, we introduce the Serre weight conjectures and their role in the Langlands program. Then, we discuss a novel idea proving the conjecture for the group GSp_4 under technical assumptions using a new geometric result on Galois deformation rings. This is based on a joint work with Daniel Le and Bao Viet Le Hung.