
SERRE WEIGHTS AND BREUIL'S LATTICE CONJECTURES IN DIMENSION THREE

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Let F/\mathbf{Q} be a number field where p is unramified and $r : \mathrm{Gal}(\overline{F}/F) \rightarrow \mathbf{GL}_3(\overline{\mathbf{Q}}_p)$ a continuous Galois representation. We assume that r is automorphic for $U(3)$ and the p -adic local parameters of r at p are tamely potentially crystalline, with Hodge-Tate weights $(0, 1, 2)$.

The local/global compatibility conjecture in the p -adic local Langlands correspondence predicts that the r -eigenspace in the integral étale cohomology on the adelic points of $U(3)$ with infinite level at p , should only depend on the p -adic local parameter associated to r , in some explicit way.

In this talk we prove the local/global compatibility conjecture when considering a tame level at p , under mild technical hypotheses on the mod p -reduction of r . More precisely, we show that the integral structure cut out by the global étale cohomology on the tame étale local system giving rise to r depends only on the p -adic local parameter.

The proof relies on the explicit construction of local Galois deformation rings in dimension three, the description of their special fiber in automorphic terms via the Breuil-Mézard conjecture, a new technique (which is a mixture of both global and local methods) to compute the mod p reduction of $\overline{\mathbf{Z}}_p$ -lattices in tame K -types.

This is joint work with Dan Le, Viet-Bao Le Hung et Brandon Levin.