ID de Contribution: **17** Type: **Non spécifié**

On the Bloch–Kato Conjecture for Some Four-Dimensional Symplectic Galois Representations

jeudi 11 septembre 2025 15:15 (1 heure)

The Bloch–Kato Conjecture predicts a relation between Selmer ranks and orders of vanishing of L-functions for Galois representations arising from etale cohomology of algebraic varieties. In this talk, I'll describe results towards this conjecture in ranks 0 and 1 for the self-dual Galois representations that come from Siegel modular forms on GSp(4) with parallel weight (3, 3); these contribute to cohomology of classical Siegel threefolds. The key step in the proof is a construction of auxiliary ramified Galois cohomology classes, which then give bounds on Selmer groups. The ramified classes come from level-raising congruences and the geometry of special cycles on Shimura varieties.

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Classification de Session: Afternoon Chair: Jonathan Pila