

Given an algebraic variety over a finitely generated field of characteristic 0, the Mumford-Tate conjecture predicts the existence of a tight link between the Hodge structure on its singular cohomology and the Galois representation on its étale cohomology. Little evidence supports this statement, which is still open for some abelian fourfolds. For hyper-Kähler varieties, the conjecture has been proven in codimension 1 by André. In my talk, I will present a strategy to attack the full Mumford-Tate conjecture for hyper-Kähler varieties. Via this method the conjecture is proven for all known hyper-Kähler varieties, together with related conjectures on their André motives. Part of the results I will present are joint work with Lie Fu and Ziyu Zhang.