

Arithmetic Geometry Day

Date: May 26, Friday, 2023

Venue: Room 638, 6 Floor, Institute of Mathematics, Academia Sinica (NTU Campus)

- 09:30-10:30 **Professor Ching-Li Chai** (University of Pennsylvania)
- Orbital rigidity of Tate-linear formal varieties and sustained p -divisible groups
- 10:30-10:50 **Tea break**
- 10:50-11:50 **Professor Kai-Wen Lan** (University of Minnesota)
- Ideally logarithmic smooth morphisms and higher direct images
- 11:50-14:00 **Lunch break**
- 14:00-15:00 **Professor Chia-Fu Yu** (Academia Sinica)
- Arithmetic invariants of supersingular abelian varieties

Abstract



A central leaf in a Siegel modular variety $A_{g,d}$ passing through a point x_0 corresponding to a polarized abelian variety (A_0, μ_0) is the locus in $A_{g,d}$ consisting of all polarized abelian varieties whose associated p -divisible groups are isomorphic to that of (A_0, μ_0) . When the abelian variety A_0 has two slopes it is known that the formal completion $C(x_0)^{/x_0}$ at x_0 of the central leaf $C(x_0)$ has a natural structure of a p -divisible formal group. It is expected that $C(x_0)^{/x_0}$ also carries a sort of "Tate-linear structure" in the general case, so that it can be assembled from a finite collection of p -divisible groups, but the precise notion of "Tate-linear structure" has not been pinned down before.

In this talk we will explain the precise definition of Tate-linear formal varieties, and a remarkable rigidity property: Suppose that Z is an irreducible closed formal subvariety of a Tate-linear variety T and is stable under a strongly nontrivial action of a p -adic Lie group on T , then Z is a Tate-linear formal subvariety of T . Details are in chapters 5,6,10,11 of the monograph "Hecke Orbits" with Frans Oort.



We will review the notions of log smooth and ideally log smooth morphisms of schemes (with suitable log structures) and explain their analogues for rigid analytic varieties over p -adic fields, and then explain under what conditions we know that the higher direct images of p -adic Kummer étale local systems are still local systems. This is based on joint work with David Sherman.



The supersingular locus is one of main interests in algebraic geometry in characteristic p , and can be described in terms of polarised flag type quotients (PFTQs) in the sense of Li and Oort. The description for $g=3$ is rather explicit and is exploited by Karemaker and Yobuko and myself for investigating the arithmetic invariants of supersingular abelian threefolds, namely, the endomorphism rings and automorphism groups of them, confirming Oort's conjecture for $g=3$. In this talk we shall explain a general method for investigating the arithmetic invariants on supersingular EO strata, and report the progress of joint work with Karemaker.

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