A central leaf in a Siegel modular variety $A_{g,d}$ passing through a point $x_0$ corresponding to a polarized abelian variety $(A_0, \mu_d)$ is the locus in $A_{g,d}$ consisting of all polarized abelian varieties whose associated $p$-divisible groups are isomorphic to that of $(A_0, \mu_d)$. 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 etale 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.

**Organizer:** Chia-Fu Yu  
Institute of Mathematics, Academia Sinica

**Contact**  
Andrea Wang (Ms.)  
Institute of Mathematics, Academia Sinica  
Tel: (+886)-2-23685999#336  
Email: andreawang@gate.sinica.edu.tw