

# Algebraic geometry

A conference in honor of Arthur Ogus on the occasion of his 70th birthday

## Titles and abstracts

**A. Beilinson** (University of Chicago)

*Title* : The singular support and the characteristic cycle of étale sheaves

*Abstract* : I will discuss some recent results of Takeshi Saito and of myself that extend the theory of Kashiwara and Schapira to algebraic varieties over a field of arbitrary characteristic.

**P. Berthelot** (Université de Rennes 1)

*Title* : Non characteristic finiteness theorems in crystalline cohomology

*Abstract* : On the crystalline site relative to  $\mathbb{Z}/p^n$ , I will explain the construction of two triangulated subcategories of the derived category of complexes of filtered modules on the structural sheaf, linked by a local biduality theorem. For these complexes, one can prove finiteness theorems for inverse and direct images which are analogous to the "non characteristic finiteness theorems" in the theory of complex D-modules, and one can generalize the classical finiteness and duality theorems in crystalline cohomology.

**B. Bhatt** (University of Michigan)

*Title* : Integral  $p$ -adic Hodge theory

*Abstract* : I will describe joint work with M. Morrow and P. Scholze on the construction of a new integral cohomology theory for smooth projective schemes over the ring of integers of a  $p$ -adic field. The new theory realizes de Rham cohomology as a specialization of étale cohomology (integrally), and thus yields consequences about torsion by semicontinuity.

**S. Bloch** (University of Chicago)

*Title* : Feynman amplitudes and limits of heights

*Abstract* : Feynman amplitudes constitute a beautiful little island of algebraic geometry surrounded by a sea of physics. Ancient AG's marooned on the island cannot help but feel skeptical about the seaworthiness of the transport physics offers from the island to the shores of reality. With the advent of string theory, physicists understand another approach, realizing Feynman amplitudes as suitable limits when the string tension goes to zero. This talk will give an algebra-geometric interpretation of the idea. The Feynman amplitude becomes an integral over the space of nilpotent orbits at a point on the boundary of the moduli space of marked curves. The integrand is a limit of heights of cycles supported on the markings. This is joint work with José Burgos Gil, Omid Amini, and Javier Fresan.

**F. Charles** (Université Paris-Sud)

*Title* : K3 surfaces over finite fields : insights from complex geometry

*Abstract* : We will describe how insights from the geometry of complex analytic K3 surfaces can be applied to the proofs of Tate and Shioda's conjectures for K3 surfaces over finite fields.

**O. Gabber** (CNRS, IHÉS)

*Title* : On the cohomology of the punctured spectrum in the mixed characteristic case

*Abstract* : [Download the pdf](#)

**K. Kato** (University of Chicago)

*Title* : Function field analogues of compactifications of period domains

*Abstract* : For a function field in one variable over a finite field, we will consider analogues of compactifications of period domains.

**C. Nakayama** (Hitotsubashi University)

*Title* : Relative log Poincaré duality

*Abstract* : Ogus and I proved the Poincaré duality theorem of Verdier's type in log Betti cohomology (Geometry and Topology 2010). I discuss the  $l$ -adic analogue, that is, relative log Poincaré duality theorems in log étale cohomology, together with other fundamental theorems in log étale cohomology.

**M. Olsson** (University of California, Berkeley)

*Title* : Derived Torelli theorem for K3 surfaces

*Abstract* : Classical Torelli theorems are in their very formulation restricted to complex algebraic varieties. In this talk I will discuss a Torelli-type theorem for K3 surfaces in positive characteristic using the derived category of coherent sheaves as a substitute for the integral structure on Betti cohomology. I will also discuss various arithmetic consequences. This is joint work with Max Lieblich.

**M. Temkin** (Hebrew University of Jerusalem)

*Title* : Wild coverings of Berkovich curves

*Abstract* : I will describe the structure of finite morphisms between smooth Berkovich curves. The tame case is well known so the accent will be on the wild case. In particular, I will describe the loci of points of multiplicity  $n$  and their relation to Herbrand function and the ramification theory. If time permits I will also talk about the different function associated to a morphism.

**V. Vologodsky** (University of Oregon)

*Title* : Motivic homotopy type of a log scheme

*Abstract* : Given a log scheme  $X$  over the field of complex numbers Kato and Nakayama associated with  $X$  a topological space  $X_{\{\log\}}$ . I will show that the homotopy type of  $X_{\{\log\}}$  is motivic in the sense of Morel and Voevodsky. The talk is based on a work in progress with Nick Howell.

**X. Zhu** (California Institute of Technology)

*Title* : Principle B for de Rham representations

*Abstract* : Let  $X$  be a smooth connected algebraic variety over a  $p$ -adic field  $k$  and let  $L$  be a  $\mathbb{Q}_p$  étale local system on  $X$ . I will show that if the stalk of  $L$  at one point of  $X$ , regarded as  $p$ -adic Galois representation, is de Rham, then the stalk of  $L$  at every point of  $X$  is de Rham. This is a joint work with Ruochuan Liu.