

**Conference on Arithmetic Geometry
Nanking 2021**

Schedule

	Feb.22	Feb.23	Feb.24	Feb.25	Feb.26
09:00 – 09:15	Opening				Group photo
09:30 - 10:30	DU Heng	ZHAO Yigeng	LI Shizhang	SHI Yousheng	GUO Haoyang
11:00 – 12:00	GAO Hui	YANG Enlin	MIN Yu	XIAO Liang	WANG Yupeng
break					
15:00- 16:00	YAN Qijun	DENG Taiwang		WANG Haoran	XU Daxin
16:30- 17:30	XUE Cong	CUI Peiyi		DING Yiwon	YU Hongjie
					Group photo

Venue

UMeet ID: 138 7338 7930 Password: 141592

DAY 1

09:00 – 09:15

Opening addressment

09:30 -10:30

Title: The arithmetic Breuil-Kisin-Fargues modules and the monodromy theorem for p -adic Galois representations

Speaker: DU Heng (Purdue University)

Abstract:

Modifications of vector bundles over the Fargues-Fontaine curve play a central role in recent developments in p -adic Hodge theory. In this talk, we will first review how Fargues use the Fargues-Fontaine curve to define the category of p -adic Hodge structures over C_p . Then I will talk about how the category of classical p -adic Hodge structures over K is embedded into this category. We will see this embedding can be characterized using something I called arithmetic Breuil-Kisin-Fargues modules. I will state some properties of arithmetic Breuil-Kisin-Fargues modules, and as an application, I will show how arithmetic Breuil-Kisin-Fargues modules help state the p -adic monodromy theorem for p -adic Galois representations.

11:00 – 12:00

Title: Integral p -adic Hodge theory in the imperfect residue field case

Speaker: GAO Hui (Southern University of Science and Technology)

Abstract:

Let K be a complete discrete valuation field with residue field admitting a finite p -basis, and let G_K be the Galois group. We construct a fully faithful functor from the category of integral semi-stable representations of G_K to the category of Breuil-Kisin G_K -modules. As an application, we classify p -divisible groups over O_K . We also expect the results to be useful in future development of relative integral p -adic Hodge theory.

15:00 – 16:00

Title: An alternative construction of the defining map for EO stratification of Shimura varieties

Speaker: YAN Qijun (YAU Mathematical Sciences Center)

Abstract:

In C. Zhang's thesis, the defining map of Ekedahl-Oort stratification, that is a map from the special fibre of Shimura variety (Hodge type, with good reduction),

was established by constructing a universal G -zip. In this talk, I will explain how to give an alternative construction that avoids the language of G -zips.

16:30 – 17:30

Title: Cohomology sheaves of stacks of shtukas (千爪兽的上同调层)

Speaker: XUE Cong (Institut Mathématique de Jussieu)

Abstract:

The stacks of shtukas play an important role in the Langlands correspondence for function fields. In this talk, we will review what are the cohomology sheaves of stacks of shtukas. Then we will talk about their smoothness properties and some applications.

DAY 2

09:30 – 10:30

Title: Duality theorems for p -primary sheaves

Speaker: ZHAO Yigeng (Westlake University)

Abstract:

We will introduce certain new p -primary sheaves on an integral scheme of characteristic p , and study their dualities. This talk is based on the joint work with Uwe Jannsen and Shuji Saito.

11:00 – 12:00

Title: Localized characteristic classes for constructible étale sheaves

Speaker: YANG Enlin (Peking University)

Abstract:

In this talk, I will first recall the theory of singular support of constructible étale sheaves after Beilinson, and then define a localized version of characteristic class, which generalize Abbes-Saito's definition. I will also propose a relationship between the localized characteristic class and the relative characteristic class. This is joint work with Yigeng Zhao in progress.

15:00 – 16:00

Title: The characteristic cycles and semi-canonical bases on type A quiver varieties

Speaker: DENG Taiwang (YAU Mathematical Sciences Center)

Abstract:

TBA

16:30 – 17:30

Title: Modulo- l representations of p -adic groups

Speaker: CUI Peiyi

Abstract:

Let F be a non-archimedean local field and k be an algebraically closed field of characteristic l different from p . Let $G(F)$ be a p -adic group. When $l=0$, as one side of local Langlands correspondence, the category of smooth k -representations of $G(F)$ has been well-developed. In this talk, we will consider the smooth k -representations of $G(F)$, when l is positive. We will talk about some relations and differences between l -adic and modulo- l representations, at the end we will give a brief introduction of theory of types.

Day 3

09:30 – 10:30

Title: Improving degeneration statements of the Hodge--de Rham spectral sequence

Speaker: LI Shizhang (University of Michigan)

Abstract:

Let X be a smooth proper scheme over W (Witt ring of a perfect field of characteristic $p > 0$), Deligne--Illusie showed that the Hodge--de Rham spectral sequence for the special fiber degenerates up to degree p , Fontaine--Messing and Kato separately showed that the spectral sequences for the mod p^n fibers (as well as X itself) degenerate up to degree $p-1$. I shall explain (part of) a recent joint work with Tong Liu (in progress) of showing the degeneration up to degree p statement (so improve the work of Fontaine--Messing and Kato on this regard by one degree).

11:00 – 12:00

Title: Integral p -adic Hodge theory of formal schemes in low ramification

Speaker: MIN Yu (Morningside Center of Mathematics)

Abstract:

In this talk, I will briefly review the theory of prismatic cohomology and talk about some results about the module structure of prismatic cohomology groups. Then I will discuss their applications to the study of integral comparison theorem and the degeneration of the (integral) Hodge-to-de Rham spectral sequence.

DAY 4

09:30 – 10:30

Title: The Kudla-Rapoport conjecture over ramified primes

Speaker: SHI Yousheng (University of Wisconsin)

Abstract:

In the nineties, Kudla formulated a conjecture relating central derivative of certain Eisenstein series to arithmetic intersection numbers of special cycles on Shimura varieties. Later Kudla and Rapoport formulated a local version of the conjecture which compares intersection numbers of special cycles on the unitary Rapoport Zink spaces over an inert prime of an imaginary quadratic field with derivatives of local density of hermitian forms. In this talk, I will review Kudla-Rapoport conjecture and its global motivation. Then I will talk about an attempt to formulate a Kudla-Rapoport type of conjecture over the ramified primes. In case of unitary Shimura curves, this new conjecture can be proved. This is a joint work with Qiao He and Tonghai Yang.

11:00 – 12:00

Title: Slopes of modular forms and ghost conjecture of Bergdall and Pollack

Speaker: XIAO Liang (Beijing International Center of Mathematical Research)

Abstract:

In classical theory, slopes of modular forms are p -adic valuations of the eigenvalues of the U_p -operator. On the Galois side, they correspond to the p -adic valuations of eigenvalues of the crystalline Frobenius on the Kisin's crystabelian deformations space. I will report on a joint work in progress in which we proved a version of the ghost conjecture of Bergdall and Pollack. This has many consequences in the classical theory, such as some cases of Gouvea-Mazur conjecture, and some hope towards understanding irreducible components of eigencurves. On the Galois side, our theorem can be used to prove certain integrality statement on slopes of crystalline Frobenius on Kisin's deformation space, as conjectured by Breuil-Buzzard-Emerton. This is a joint work with Ruochuan Liu, Nha Truong, and Bin Zhao.

15:00 – 16:00

Title: On the Mod p Cohomology for GL_2

Speaker: WANG Haoran (YAU Mathematical Sciences Center)

Abstract:

Let F be a totally real field unramified at all places above p and D be a quaternion algebra over F which splits at exactly one infinite place. The mod p cohomology of the Shimura curve

associated to D has a great interest from the point of view of the mod p Langlands program. Let v be a fixed place of F over p . I will report on our results on the smooth admissible representations of $GL_2(F_v)$ occurring in the corresponding Hecke eigenspaces of the mod p cohomology, when the local Galois representation at v is non-semisimple and sufficiently generic. This is a joint work with Yongquan Hu.

16:30 – 17:30

Title: Locally analytic Ext^1 for $GL_2(Q_p)$

Speaker: DING Yiwen (Beijing International Center of Mathematical Research)

Abstract:

Breuil and Ding have constructed certain functors from locally analytic representations to generalized pro- (ϕ, Γ) -modules over Robba rings, which lead to a refined version of Breuil's conjecture on the locally analytic Ext^1 . In this talk we review these constructions and explain a proof of the conjecture in the case of $GL_2(Q_p)$.

DAY 5

09:00 – 09:15

Group photo

09:30 - 10:30

Title: Derived De Rham cohomology in non-archimedean geometry

Speaker: GUO Haoyang (University of Michigan)

Abstract:

In complex algebraic geometry, a well-known result of Grothendieck states that the singular cohomology of a complex smooth proper variety X is isomorphic to its algebraic de Rham cohomology, namely the cohomology of its de Rham complex. In general for non-smooth varieties, to recover singular cohomology using algebraic constructions, Illusie introduces the notion of the *derived de Rham complex*, which by a result of Bhatt computes singular cohomology.

In this talk, we consider the p -adic analogue of algebraic de Rham cohomology, and introduce a generalization of the derived de Rham complex to non-archimedean geometry. We show the cohomology of the derived de Rham complex for a proper rigid analytic space satisfies most of the good properties as in the complex theory, and is compatible with the classical construction for algebraic varieties. Moreover, together with Shizhang Li we extend our construction to perfectoid algebras, and recover Scholze's period sheaves with their p -adic Poincaré sequence using differentials.

11:00 – 12:00

Title: A p -adic Simpson correspondence for rigid analytic varieties

Speaker: WANG Yupeng (Morningside Center of Mathematics)

Abstract:

The p -adic Simpson correspondence for proper smooth schemes over \mathbb{Z}_p was firstly studied by Faltings. Over the field \mathbb{C} of p -adic complex numbers, we can construct a p -adic Simpson correspondence for a rigid analytic variety X with a liftable good reduction over \mathbb{O}_C by constructing a new period sheaf on the pro-étale site of X .

In this talk we give a new description of Faltings Extension by using the theory of cotangent complexes. We then construct the desired sheaf of periods. We introduce a decompletion theorem which is used to compute cohomologies, which leads to the p -adic Simpson correspondence. If time permits, I will talk about the semi-stable reduction case, which is a joint work with SHENG Mao.

15:00 – 16:00

Title: Drinfeld Lemma for F -isocrystals

Speaker: XU Daxin (Morningside Center of Mathematics)

Abstract:

Drinfeld's lemma for l -adic local systems is a fundamental result in arithmetic geometry. It plays an important role in the Langlands correspondence for a reductive group over the function field of a curve over a finite field, pioneered by Drinfeld for GL_2 and subsequently extended by L. Lafforgue and then V. Lafforgue.

In this talk, we will discuss Drinfeld's lemma for p -adic local systems: overconvergent F -isocrystals. This is based on a joint work with Kiran Kedlaya.

16:30 – 17:30

Title: Irreducible cuspidal automorphic representations with prescribed local behavior

Speaker: YU Hongjie (Institute of Science and Technology of Austria)

Abstract:

Let G be a reductive group defined over a function field F . I use a variant of Arthur's trace formula to determine the sum of the multiplicities of the irreducible representations in the cuspidal automorphic spectrum of G , with specified local behavior at a finite set of places of F and unramified elsewhere. This sum is given in terms of the mass of F_q points of some Hitchin moduli stack defined by Chaudouard-Laumon. For $GL(n)$, it expresses the number of l -adic local systems over a curve with specified tame ramification in terms of the number of stable parabolic Higgs bundles.

(group photo planned before or after this talk)

