Abstracts

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Pierre Colmez
Institut de Mathématiques de Jussieu, France

Emerton's Factorization of Completed Cohomology

I will report on our joint work with Shanwen Wang on the factorization of the Beilinson-Kato system as a product of two modular symbols. Emphasis will be put on a new proof of Emerton's factorization of the completed cohomology of the tower of modular curves.

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David Helm
Imperial College London, UK

Co-Whittaker families for quasi-split groups

In his tensor factorization of the completed cohomology of the modular tower (with Z_p-coefficients), Emerton observed that the local factors corresponding to primes ℓ different from p could be uniquely characterized, up to isomorphism, by a short list of properties relating such a factor to the associated local Galois representation (in particular, such factors satisfied a form of Ihara's lemma and agreed generically with the representations of GL_2 associated to the local Galois representation via local Langlands.)In later joint work Emerton and I proved that, given an n-dimensional local Galois representation, there was at most one family of representations of GL_n over the same base that satisfied a similar set of desiderata; such families were later shown to always exist by joint work of mine with Gil Moss.

We show that an analogous construction can be made for any quasi-split group over a local field F, and explain a (conjectural) connection between this construction and the categorical local Langlands correspondence.

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Teruhisa Koshikawa
RIMS, Kyoto University, Japan

Cohomology of log prismatic F-crystals

After the foundations of Bhatt-Scholze, Bhatt-Lurie, and Drinfeld, the relative cohomology of prismtaic F-crystals (and F-gauges) has been studied extensively, e.g., in the works of Guo-Reinecke and Guo-Li. I will present my current understanding of the logarithmic version. This is based mainly on my earlier work with Zijian Yao and ongoing work with Kentaro Inoue.

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Shizhang Li
Morningside Center of Mathematics, China

p-adic Trace and (generalized) Poincare Duality

I will give a quick tour guide to my recent preprint written with Emanuel Reinecke and Bogdan Zavyalov, which treats a relative Poincaré duality statement for proper morphisms between rigid spaces over mixed characteristic nonarchimedean fields (previously conjectured by Bhatt--Hansen). Detailed plan for each talk is as follows.

Talk 1: We shall see main statements and some background history on étale cohomology of rigid spaces.

Talk 2: We shall explain how Poincaré duality and preservation of lisse local systems under higher pushforward along a smooth proper morphism of analytic locally Noetherian adic spaces can be obtained once we have cycle class + trace map satisfying expected axioms.

Talk 3: In this talk we will explain how to construct trace maps (with appropriately Tate-twisted and shifted constant coefficients) for arbitrary equi-dimension d smooth morphisms between analytic locally Noetherian adic spaces, which satisfies expected axioms.

Talk 4: We shall explain how the trace constructed in the previous talk can be used to define trace maps (this time with dualizing complexes, as defined by Bhatt--Hansen, being our coefficients) for arbitrary proper morphisms between rigid spaces over mixed characteristic nonarchimedean fields. This construction actually leads to a proof of the aforementioned conjecture by Bhatt--Hansen.

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Lucas Mann
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Six-functor Formalisms and Categorical Langlands

Six functor formalisms are a great tool to organize the data that go into a cohomology theory, like étale, singular or coherent cohomology, thereby streamlining and abstracting many arguments and constructions that work in any (reasonable) such theory. In recent years it has become apparent that 6-functor formalisms have a much richer abstract theory than one might think at first, and that this theory in particular provides important finiteness conditions on sheaves in a cohomology theory. In this minicourse we will discuss the definition of 6-functor formalisms and the attached finiteness conditions on sheaves. We will then discuss how these notions manifest in specific examples, including smooth representations of locally profinite groups.

By applying the theory to Fargues-Scholze's stack Bun_G of G-bundles on the Fargues-Fontaine curve, we will gain new insights on the expected categorical local Langlands correspondence, especially its behavior with respect to various dualities. We then use this knowledge to sketch a proof of the categorical Langlands conjecture for GL_2(Q_p). Much of this material is based on joint works with David Hansen and with Claudius Heyer.

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Wieslawa Niziol
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Duality Theorems in p-adic Analytic Geometry

I will discuss duality theorems for p-adic geometric pro-etale cohomology of partially proper rigid analytic varieties. The first two talks will address the dualities on the Fargues-Fontaine curve by reducing them to coherent dualities, the remaining two -- will descend these dualities to the world of Topological Vector Spaces. This is a joint work with Pierre Colmez and Sally Gilles.

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Ziquan Yang
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Pointwise criterion for p-adic local systems

Let S be a connected smooth rigid analytic variety over a p-adic field K, and let V be a p-adic local system over S. A celebrated theorem of Liu and Zhu states that if V is de Rham at one classical point, then V is globally de Rham. When S has good reduction over the ring of integers of K, one naturally asks about analogous statements when we replace "de Rham" with "crystalline" or "semi-stable." It is well known that the naive analogues are false. In joint work with Haoyang Guo, we prove that Liu-Zhu's result can be remedied if one tests at "sufficiently many" points when a good integral model for S is chosen. In particular, if V is crystalline or semi-stable at every classical point, then it is crystalline or semi-stable. Since Haoyang has already given a talk on this topic at a conference at the University of Chicago, and the recording is available on YouTube, I will avoid excessive overlap with his presentation, which focuses more on applications, and instead discuss the actual proof of the result.

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