Titles and abstracts

Tamás Csige
Title: The Grothendieck group of p-adic distribution algebras.

Abstract: Let $\mathbb{Q}_p \subseteq L$ be a finite extension and let G be a L-analytic group. Banach space representations resp. locally analytic representations of G are very important objects in the p-adic Langlands progamme. They correspond to certain modules over the so-called continuous resp. locally analytic distribution algebra. In this talk we investigate the (algebraic) Grothendieck group, i.e. K_0 of these algebras and give a complete answer when $\mathbb{Q}_p = L$. We also look into the case when $\mathbb{Q}_p \not = L$ which is already very interesting for $G=\mathcal{O}_L$, the ring of interes of L. In this case the locally analytic distibution algebra is isomorphic to the ring of global holomorphic functions on a certain rigid analytic variety which is called the p-adic character variety. Its K-rational points are in bijection with the locally analytic characters $\mathcal{O}_L \to K^{*}$, where $L \subseteq K$ and K is complete. This geometric object is connected in a deep way to certain Robba rings and Lubin-Tate (φ, Γ)-modules.

Yiwen Ding:
Title: L-invariants for GL3(Qp).

Abstract: Let V be a 3-dimensional semi-stable non-crystalline representation of Gal_{Qp}. We associate to V a locally analytic representaiton Pi(V) of GL3(Qp) containing the full information of V. In particular, Pi(V) contains the information of Fontaine-Mazur L-invariants of V. We prove a local-global compatibility result when V is ordinary. This is a joint work with Christophe Breuil.

Yuval Flicker:
Title: Generalized Schur-Weyl duality

Abstract: A duality theorem in mathematics relates two seemingly unrelated objects: this is its attraction. An early example was discovered by Schur in his 1901 Berlin thesis. He found a relation between representations of the symmetric group S_d, and those of GL(n). A super analogue, reminiscent of bosons and fermions, involving the supergroup GL(m|n), followed. In influential works of 1986, Drinfeld and Jimbo extended Schur's duality to relate representations of the quantum general linear group, with those of the Hecke algebra, the latter defined using their universal R-matrices solutions of the Yang-Baxter equations. Chari and Pressley then studied the affine case. I shall attempt to describe the ultimate extension, to the super affine quantum situation. In particular I construct a functor relating suitable categories of affine Hecke modules - important in number theory - and of affine quantum supergroups - from physics, as a modern twist of Schur's duality, afforded by Yamane's presentation of these supergroups.

Ulrich Görtz
Title: Stratifications of affine Deligne-Lusztig varieties.

Abstract: Affine Deligne-Lusztig varieties are schemes, locally of finite type over a finite field, which are analogues of Deligne-Lusztig varieties in the context of an affine root system. They are locally closed subschemes of (partial) affine flag varieties, and are an important tool in studying the geometry of Rapoport-Zink spaces, certain deformation spaces of p-divisible groups.

In the talk, we will discuss some geometric properties of affine Deligne-Lusztig varieties, in particular the Bruhat-Tits stratification and Chen and Viehmann's J-stratification.

Elmar Große-Klönne:
Title: A mod p local Langlands type correspondence for p-adic ${\rm GL}_n$'s.

Abstract: Let F be a finite extension of ${\mathbb Q}_p$, let $n\in{\mathbb N}$, let k be a (sufficiently large) field of characteristic p. Put $G={\rm GL}_n(F)$. Ideally, an (as yet hypothetical) mod p-local Langlands correspondence should relate (suitable) admissible smooth G-representations over k with n-dimensional ${\rm Gal}(\overline{F}/F)$-representations over k. As an approximation, we construct a similar correspondence with G-representations

replaced by modules over the pro-p-Iwahori-Hecke k-algebra H of G. An entirely new feature (e.g. when compared with more traditional Langlands type correspondences) is that this correspondence is even induced by an exact functor of abelian categories which is fully faithful on supersingular H-modules.

Jan Kohlhaase
Title: Coefficient systems on the Bruhat-Tits building and pro-p Iwahori-Hecke modules

Abstract: Let G be the group of rational points of a split connected reductive group over a nonarchimedean local field of residue characteristic p. Let I be a pro-p Iwahori subgroup of G and let R be a commutative quasi-Frobenius ring. If H=R[I\G/I] denotes the pro-p Iwahori-Hecke algebra of G over R we clarify the relation between the category of H-modules and the category of G-equivariant coefficient systems on the semisimple Bruhat-Tits building of G. If R is a field of characteristic zero this yields alternative proofs of the exactness of the Schneider-Stuhler resolution and of the Zelevinski conjecture for smooth G-representations generated by their I-invariants. In general, it gives a description of the derived category of H-modules in terms of smooth G-representations and yields a functor to generalized (phi,Gamma)-modules extending the constructions of Colmez, Schneider and Vigneras.

Joachim Mahnkopf
Title: "p-Adic properties of automorphic forms".

Abstract: We want to give a first introduction to p-adic aspects of the theory of automorphic forms, in particular we want to introduce the concept of p-adic families of automorphic forms. We will start with the case of classical modular forms and if time permits we also want to touch on the higher rank case.

Marc Masdeu:
Title: p-adic analytic constructions of algebraic points.

Abstract: The theory of complex multiplication was developed by Kronecker but was already started by Eisenstein and even by Gauss. The aim of this program, known as Kronecker's Jugendtraum, is to generate all abelian extensions of a number field by adjoining "special values" of

"periodic functions", which are known as singular moduli. In a similar vein, the construction due to Heegner of algebraic points on elliptic curves can be seen also as a 1-dimensional version of the previous construction (which would be 0-dimensional).

In the late 1990's Henri Darmon introduced a construction of p-adic analytic points on elliptic curves, known initially as Stark—Heegner points, which are conjectured to being defined over

abelian extensions of real-quadratic fields. Somewhat backwards from a historical perspective, Darmon--Vonk introduced in 2017 the corresponding analogue of singular moduli.

The goal of these two talks is to introduce all of these constructions from a unified point of view. In the first talk I will review the classical constructions and introduce the tools to define the new p-adic analogues. The second talk will be devoted to the conjectures of Darmon and Darmon--Vonk.

Nicolas Schmidt:
Title: The Cohomology of Root Data.

Abstract: In a 1966 article, Jacques Tits studied the normalizer of a maximal split torus in a split reductive group as an extension of the torus by the Weyl group. A natural question to ask is, when does this sequence split? Although Tits announced it in his article, a complete solution of this question (for semsimple almost-simple groups) wasn't published until 2017 (Adams-He). In this talk, I will outline a different strategy to resolve this question by computational means. Both practical questions (how to compute cohomology of Coxeter groups efficiently) and theoretical questions (how to extend the results of finitely many computations to infinitely manycases) will be addressed. Partial results will be presented, and some evidence will be given for an analogue of Nakaoka's theorem concerning (co-)homological stability of symmetric groups for nontrivial coefficients.

Árpád Tóth:
Title: Modular cocycles

Abstract: I will review some important facts about modular forms, esp. Dedekind's eta function. This leads naturally to Ghys' interpretation of the transformation formula of eta in terms of linking numbers of closed geodesics with the "knot at infinity". I will outline some other cocycles that arise in an attempt to better understand close geodesics.

Gergely Zábrádi :
Title: Multivariable (phi,Gamma)-modules.

Abstract: The notion of multivariable (phi,Gamma)-modules were introduced recently in order to generalize (parts of) Colmez's work on the p-adic Langlands programme from GL_2(Qp) to groups of higher rank. More specifically: there exists a functor from the category of smooth mod p^n representations of the group G of Qp-points of a Qp-split reductive group with connected centre to d-variable (phi,Gamma)-modules where d is the number of simple roots of G. This functor has promising exactness- and compatibility properties.Further, there is a Fontaine-style equivalence of categories between these multivariable objects and p-adic representations of d-fold products of local Galois groups. There is a new proof of this fact using Drinfeld's lemma for perfectoid spaces (jt. with Annie Carter and Kiran S. Kedlaya). During the 2 talks I plan to give an introduction to this circle of ideas and formulate a conjecture what the combination of the two functors above should produce when applied to certain Hecke-isotypical components of the cohomology of Shimura varieties. In part also joint work with Aprameyo Pal.