ABSTRACTS

Workshop I on "Local Models of Shimura Varieties and related Topics"

April 20 - 24, 2015:

Monday

Ulrich Görtz (U Duisburg-Essen)

Basic loci of Coxeter type in Shimura varieties

To understand arithmetic properties of Shimura varieties, one studies their reduction over finite fields. One of the principal tools to investigate the special fiber is the Newton stratification. There is a unique closed Newton stratum, the so-called basic locus. In certain cases it is possible to understand the geometric structure of the basic locus very explicitly, as a union of classical Deligne-Lusztig varieties with a description of the closure relations between them in terms of a Bruhat-Tits building. We will present a group-theoretic approach in terms of affine Deligne-Lusztig varieties which gives a conceptual understanding in which cases one can hope for such a simple description and how it should look like.

Thomas Zink (U Bielefeld)

Displays for varieties of K3-type

This is joint work with Andreas Langer. We define varieties of K3-type. The main examples are K3-surfaces or Hilbert schemes of points on K3-surfaces. Let $f : X \to S$ be a family of varieties of K3-type. We define a canonical horizontal bilinear on $H^2_{DR}(X/S)$ which coincides with the Bogomolov-Beauville form in the case $S = \mathbb{C}$.

Let A be an artinian local ring with residue class field k, a perfect field of characteristic p. Assume that $S = A$. Then we associate to X a polarized 2-display $\mathcal{P}$ over the small Witt ring $\hat{W}(A)$. This is a certain equivalence class of matrices over $\hat{W}(A)$. If $\mathcal{P}$ is ordinary $\mathcal{P}$ has the same deformation theory as X. In general we have crystals of displays.

Tuesday

Brian Smithling (Johns Hopkins U)

On the moduli descriptions of some local models

Pappas and Zhu have recently given a general group-theoretic definition of local models with parahoric level structure, valid for any tamely ramified group, but it remains an interesting problem to characterize the local models, when possible, in terms of an explicit moduli problem. In the case of split GO(2g), Pappas and Rapoport have given a conjectural moduli description of the local model, the crucial ingredient being the so-called *spin condition*. I will report on the proof of their conjecture in the case of a certain maximal (but not hyperspecial) parahoric level. Time permitting, I will also comment on the case of local models for ramified, quasi-split unitary groups. Here there is also an analog of the spin condition, but it turns out that this needs to be strengthened in general.

Thomas Haines (U Maryland)

The strongly admissible set and the Pappas-Rapoport-Smithling conjecture

I will introduce the the strongly admissible set and show how it is used to prove the conjecture of Pappas-Rapoport-Smithling on vertexwise admissibility. Combined with the coherence conjecture proved by X. Zhu, this allows us to describe the Pappas-Zhu local model attached to a facet in terms of the corresponding local models attached to the vertices of that facet.

Wednesday

Eugen Hellmann (U Bonn)

Degenerations of families of trianguline Galois representations

Trianguline representations are certain classes of representations of local Galois groups that naturally arise in (p-adic) families. We analyze the geometry of the space parametrizing all trianguline representations at some points where the triangulation degenerates. This has applications to the classicality of p-adic automorphic forms.

Ulrich Görtz (U Duisburg-Essen)

Local models and quiver Grassmannians

Quiver Grassmannians are closed subschemes of products of Grassmannians which parameterize subrepresentations of a fixed quiver representations; usually they are highly singular. I will explain that in certain cases their singularities can be described in a simple way by matrix equations. This relationship sometimes allows to prove properties of the quiver Grassmannian, and sometimes, conversely, of the matrix equations. Example cases are local modelsfor certain unitary Shimura varieties and linked Grassmanniansäs introduced by Osserman.

Thursday

Thomas Haines (U Maryland)

Local models for $\Gamma_1(p)$-level structure, I

This is the first of two talks on joint work with Benoit Stroh. I will introduce the objects in the local model diagram, describe some of the properties of the local model, and show how we make a connection with (enhanced) affine flag varieties.

Michael Rapoport (U Bonn)

Arithmetic Transfer and local models

I will try to explain the AT conjecture which is a conjecture on intersections of cycles on Rapoport-Zink spaces inspired by the Arithmetic Fundamental Lemma conjecture of Wei Zhang; this conjecture inspires other conjectures on local models and basic loci of Shimura varieties.

Friday

Benoit Stroh (U Paris 13)

Local models for $\Gamma_1(p)$-level structure, II

This talk will discuss nearby cycles related to local models for $\Gamma_1(p)$-level structure and will explain some connections with results of Bezrukavnikov and others in the geometric Langlands program.

Anthony Scholl (U Cambridge)

Plectic cohomology of Shimura varieties

I will discuss joint work with Jan Nekovář on a (largely conjectural) new cohomology theory for a certain class of Shimura varieties.