Winter seminar of the Darmstadt algebra group

February 18 – 25, 2018

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<tr><th></th><th>Monday</th><th>Tuesday</th><th>Wednesday</th><th>Thursday</th><th>Friday</th></tr>
<tr><td>08:00 – 08:45</td><td>Breakfast</td><td>Breakfast</td><td>Breakfast</td><td>Breakfast</td><td>Breakfast</td></tr>
<tr><td>09:00 – 09:50</td><td rowspan="6">Working/Skiing</td><td>Möller M.</td><td rowspan="6">Working/Skiing</td><td>Wedhorn</td><td rowspan="6">Working/Skiing</td></tr>
<tr><td>09:50 – 10:00</td><td>Coffee break</td><td>Coffee break</td></tr>
<tr><td>10:00 – 10:50</td><td>Zachhuber</td><td>Henkel</td></tr>
<tr><td>10:50 – 11:00</td><td>Coffee break</td><td>Coffee break</td></tr>
<tr><td>11:00 – 11:50</td><td>Dittmann</td><td>Hesse</td></tr>
<tr><td>12:00 – 13:00</td><td>Informal discussions</td><td>Informal discussions</td></tr>
<tr><td>13:00 – 15:00</td><td>Lunch break</td><td>Lunch break</td><td>Lunch break</td><td>Lunch break</td><td>Lunch break</td></tr>
<tr><td>15:00 – 15:50</td><td>Möller S.</td><td>Bruinier</td><td rowspan="4">Working/Skiing</td><td rowspan="4">Working/Skiing</td><td rowspan="4">Working/Skiing</td></tr>
<tr><td>15:50 – 16:10</td><td>Coffee break</td><td>Coffee break</td></tr>
<tr><td>16:10 – 17:30</td><td>Rössler</td><td>Kiefer
Buck</td></tr>
<tr><td>17:30 – 19:30</td><td>Informal discussions</td><td>Informal discussions</td></tr>
<tr><td>19:30 – 20:30</td><td>Dinner</td><td>Dinner</td><td>Dinner</td><td>Dinner</td><td>Dinner</td></tr>
<tr><td>20:45 – 21:15</td><td>Völz</td><td>Evening session</td><td>Neururer</td><td>Alfes</td><td>Evening session</td></tr>
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- 50 min: Jan Bruinier, Timo Henkel, Jens Hesse, Martin Möller, Sven Möller, Maximilian Rössler, Torsten Wedhorn
- 40 min: Johannes Buck, Moritz Dittmann, Paul Kiefer
- 30 min: Claudia Alfes, Michalis Neururer, Fabian Völz, Jonathan Zachhuber

TITLES AND ABSTRACTS

Claudia Alfes	**The Lewis-Zagier Correspondence** In this talk we give a brief introduction to the Lewis-Zagier correspondence.

Jan Bruinier	**Geometric and arithmetic Siegel-Weil-formulas** tba

Johannes Buck	**Desingularization of singularities at cusps of Hilbert modular surfaces** tba

Moritz Dittmann	**Reflective automorphic products on lattices of squarefree level** We describe the classification of reflective automorphic products on lattices of squarefree level.

Timo Henkel	**The Ekedahl-Oort stratification on the flag variety** Analogously to the Newton stratification on the flag variety introduced by Caraiani and Scholze, we define the corresponding Ekedahl-Oort stratification. We focus on the case of the general linear group and explain the geometric interpretation in this case using vector bundles over the Fargues-Fontaine curve. Finally, we explain an easy but non-trivial example.

Jens Hesse	**Local models** I will discuss what local models are (in particular those considered by Kisin-Pappas-Zhu), why they are useful and how they relate to the construction and understanding of integral models of Shimura varieties.

Paul Kiefer	**Boundary Components of the Orthogonal Upper Half-Plane and the Siegel Operator** In this talk we will introduce the boundary components of the orthogonal upper half-plane and the Siegel operator. In contrast to the classical case of elliptic modular forms, the boundary components of the orthogonal upper half-plane can be 1-dimensional, which look like usual upper half-planes. We now want to examine the behaviour of modular forms at these boundary components. In the 0-dimensional case this is done by looking at the constant Fourier coefficient. For the 1-dimensional boundary components we will introduce the so called Siegel operator which yields an elliptic modular forms for every boundary component. We start by giving an introduction to the orthogonal upper half-plane and explain how the boundary components look like. Afterwards we introduce the notion of orthogonal modular forms and the corresponding Fourier expansion. Finally we define the Siegel operator and apply it to some examples.

Martin Möller	**Kopfkissenüberlagerungen und ein Vertex-Operator** tba

Sven Möller	**Cyclic Orbifolds of the Leech lattice VOA** Recent results have established that the weight-one space of a (suitably regular) holomorphic VOA is one of 71 Lie algebras (Schellekens' list) and all of these cases have now been constructed in a joint effort by many authors. The main tool for constructing these VOAs is the orbifold construction, which we established for arbitrary cyclic groups of automorphisms. While we believe that the orbifold theory can and should be extended to more general (in particular non-abelian) groups, it is still interesting to study the effectiveness of cyclic orbifolding. We therefore study how many of the 71 cases can be obtained directly by cyclic orbifolding from the Leech lattice VOA. (In analogy to the construction of the 23 Niemeier lattices from the Leech lattice.) In an ongoing effort we have constructed 53 cases so far. If all 71 cases could be constructed from the Leech lattice in this way, this would help to gain a more conceptual understanding of Schellekens' list. (This is work in progress joint with Nils Scheithauer)

Michalis Neururer	**Fourier expansions at cusps and automorphic representations** I will present an algorithm that calculates Fourier expansions of modular forms at arbitrary cusps. Then I will talk about applications of this algorithm to the calculation of automorphic representations associated to modular forms.

Maximilian Rössler	**Dimension formulas for orthogonal modular forms and toroidal compactifications of locally symmetric spaces** In this talk we outline Mumford's approach to dimension formulas for orthogonal modular forms via the Hirzebruch-Riemann-Roch theorem. We review Mumford's construction of smooth (toroidal) compactifications of locally symmetric spaces in the case of orthogonal groups of signature $(2, n)$ with emphasis on the explicit description of the occurring geometric objects.

Fabian Völz

Kronecker limits formulas via theta lifts

The classical Kronecker limit formula describes the constant term in the Laurent expansion at the first order pole of the classical non-holomorphic Eisenstein series. This famous formula can also be obtained by using the powerful machinery of Borcherds products. In my talk I will present this idea and show that it can also be used to obtain Kronecker limit formulas for certain non-standard non-holomophic Eisenstein series. These Eisenstein series can be understood as weight 0 analogs of Zagier's famous cusp forms associated to classes of quadratic forms.

Torsten Wedhorn

Cycle Classes in Good Reductions of Shimura Varieties

I report on work in progress together with P. Ziegler on the computation of cycle classes for closed Ekedahl-Oort strata in good reductions of Shimura varieties of abelian type.

Jonathan Zachhuber

Linear submanifolds of the moduli space of flat surfaces

The moduli space of flat surfaces has a natural stratification and each stratum admits linear coordinates. We discuss some results and many open questions surrounding the geometry of these strata and their linear submanifolds.