Universität Bonn
Mathematisches Institut
Prof. Dr. M. Rapoport, Dr. J. Stix

List of talks for the seminar

Local Langlands Correspondence for GL(2) part II

— winter term 2008–2009, Do 14–16, SR D —

All §x.y without further reference refer to [BH06]. An * marks talks which rely partly on part 1 of the seminar.

1. Dominik Klein

   Analysis on locally pro-finite groups. Compactly supported functions, Haar measure, Haar integral, modulus character, unimodular groups §3.1-3; duality for (compactly-) induced representations §3.4+5.

2. Lennart Meier

   The Hecke algebra. Hecke algebra §4.1; smooth modules versus smooth representations §4.2; action of K-biinvariant functions on the set of K-invariants §4.3; separation property §4.4; spherical Hecke algebra and intertwining §11.1 Definition + Proposition 2, §11.2-3.

3. Martin Kreidl

   The mirabolic group. Representation theory of the unipotent radical of the Borel $N \cong (F, +)$ §8.1; representation theory of the mirabolic group §8.2+3.

4. Ulrich Terstiege

   The Jacquet module. The Jacquet module and principal series representations §9.1; Restriction-Induction Lemma §9.3; projection formula §9.5 (9.5.2); composition series of parabolic induced representations for $\mathrm{GL}_2(F)$, irreducibility criterion, Classification Theorem of principal series representations §9.6–11.

5. Philipp Hartwig

   Matrix coefficients. Matrix coefficients §10.1; dichotomy: principal series (subrepresentation of some $\mathrm{Ind}_B^G(\chi)$) versus cuspidal representations (matrix coefficients are compactly supported modulo the center) §10.2; irreducible representations are admissible (zulässig) §9.4 + §10.1; the compactly induced representaions from cuspidal types[1] are cuspidal §11.4[2].

[1]No details about cuspidal types required. One only needs to know that all of these representations are shown to be irreducible by theorem §11.4

[2]First part of the proof of Theorem 11.4

6. Peter Scholze

   The Exhaustion Theorem*. The exhaustion theorem, irreducible representations with Iwahori fixed vector §14, §17.1–3.

7. Timo Richarz

   Analysis on $\mathrm{GL}_1(F)$**.** Fourier transform, inversion formula §23.1, zeta function of a compactly supported function, L-function, functional equation §23.2+3, Tate local ε-factors, Tate's local functional equation, behaviour of local ε-factors under unramified twist and change of additive character §23.4, §23.5 Lemma 1.

8. Eugen Hellmann

   Analysis on $\mathrm{GL}_2(F)$**.** Fourier transform, zeta function, Godement–Jacquet functional equation, Godement–Jacquet local ε-factor, behaviour of local ε-factors under unramified twist and change of additive character §24.1–5; proof of the Godement–Jacquet functional equation for cuspidal representations §24.6+7.

9. Alexander Ivanov

   Gauß sums and stability theorem.* GL_1-case: Gauß sums, stability theorem §23.5 Theorem 1, §23.6+7; GL_2-case: nonabelian Gauß sums, stability theorem §25.

10. Oliver Lorscheid

    Proof of the functional equation for principal series Essentially square integrable representations, discrete series §17.4–10[3]; The Godement–Jacquet functional equation for principal series representations §26.

11. Eva Viehmann

    The Converse Theorem. The Converse Theorem, characterisation of cuspidal representations by trivial L-functions of all twists §27.

12. nn.

    Local ε-functions for Galois representations. Langlands–Deligne local ε-factors, formulas for local ε-factors under unramified twist and change of additive character, stability formula, functional equation §29.

    Inducing constants, Brauer Induction Theorem, inducing constants are determined by values on characters, global L-function, global functional equation and global ε-factor, construction of local Langlands–Deligne ε-factors from global approximation §30.

13. nn.

    Weil–Deligne representations. Weil–Deligne representations, Artin L-function, local ε-factors, relation with ℓ-adic representations, Grothendieck's Monodromy Theorem, Frobenius semisimple representations §31, §32.

14. nn.

    The local Langlands Correspondence — comparison of L-function and ε-factors. The Langlands constants §30.4; the Langlands Correspondence — complete proofs in the tame case §33, §34; the ℓ-adic correspondence §35.

[3] as needed for the rest

Literatur

[BH06] Bushnell, C. J., Henniart, G., *The local Langlands Conjecture for* GL(2), Grundlehren der Math. Wissenschaften **335**, Springer, 2006.

[De73] Deligne, P., Les constantes des équations fonctionnelles des fonctions L, in *Modular functions of one variables II*, LNM **349**, Springer, 1973.

[Se77] Serre, J.-P., *Linear representations of finite groups*, translated from the French edition *Représentations linéaires des groupes finis*, GTM **42**, Springer, 1977.

[Se79] Serre, J.-P., *Local Fields*, translated from the French edition *Corps locaux*, GTM **67**, Springer, 1979.

[Ta65] Tate, J. T., Fourier analysis in number fields, and Hecke's zeta-functions, in J. W. S. Cassels, A. Fröhlich (eds.), *Algebraic number theory*, Academic Press, 1967.

[Ta77] Tate, J. T., Local constants, prepared in collaboration with C. J. Bushnell and M. J. Taylor, in *Algebraic number fields: L-functions and Galois properties*, Proc. Sympos., Univ. Durham, 1975, 89–131, Academic Pres, London, 1977.

[We00] Wedhorn, T., The local Langlands correpondence for GL(n) over p-adic fields, arXiv:math.AG/0011210v2, 25 Nov 2000.