

**CONFERENCE IN MEMORY OF JOSEPH SHALIKA:
ABSTRACTS OF TALKS**

MAY 7 AND 8, 2011

1. “On Shalika’s work on integral representations of L -functions” by James Cogdell (Ohio State).

Abstract: This talk is a survey of the contributions of Shalika to the theory of integral representations of L -functions. Of course, other than his first papers, all of Shalika’s work on this topic, which was spread over more than 15 years, was joint with Jacquet or with Jacquet and Piatetski-Shapiro. It is impossible for me to separate out their individual contributions and there is no reason to do so. I will try to lay out the flow of their collaboration and place it in the context of a natural paradigm for thinking about integral representations. If time permits, I will then talk more about three significant papers: the paper on $GL(3)$, the classification paper, and the paper on the exterior square L -function.

2. “On the extension of the fundamental lemma for a certain relative trace formula to the full Hecke algebra” by Masaaki Furusawa (Osaka)

Abstract: (This is a joint work with Kimball Martin and Joseph Shalika.) The speaker and Martin formulated a certain relative trace formula for the group $GS(4)$, which we expect to establish an explicit formula for the central critical value of the spinor L -function in terms of the Bessel period. We proved the fundamental lemma for the unit element of the Hecke algebra. In this talk, we would like to discuss the recent result of the extension of the fundamental lemma to the full Hecke algebra by the speaker, Martin and Shalika. Our method is by the Fourier inversion based on the computations of the Plancherel measures utilizing the explicit formulas for the Bessel and Whittaker models. The theory of the Macdonald polynomials plays an important role..

3. “A new look at the converse theorem (d’apres Lafforgue)” by Hervé Jacquet (Columbia)

Abstract: In his article “Construire un noyau de la fonctorialité” L.Lafforgue develops a certain method of establishing automorphic induction for $GL(2)$ over functional fields (under unramified assumption). His method goes back to an article by Langlands called “Beyond endoscopy”.

I will show that Lafforgue’s method can be extended to the case of number fields without any assumption on ramification.

4. “A variation on Shalika’s strong multiplicity one theorem for $GL(n)$ ” by Dinakar Ramakrishnan (Caltech).

Abstract: A classical result of Tchebotarev implies that an irreducible, semisimple ℓ -adic representation R of the absolute Galois group of a number field K is determined (up to isomorphism) by the characteristic polynomials of Frobenius elements at any set S of primes of density 1. The analogue for cusp forms of $GL(n)$ is open for $n > 2$, though a famous (strong multiplicity one) theorem due to Shalika, and independently to Piatetski-Shapiro, asserts that any S containing all but a finite number of primes will do. In this talk we consider solvable Galois extensions K/k and present a method, verified explicitly up to twist equivalence for K/k cyclic of prime degree, to show that a cuspidal automorphic representation Π of $GL(n, \mathbb{A}_K)$ is determined up by the knowledge of its local components at the (density one) set $S_{K/k}^1$ of primes of K of degree 1 over k . The analytic input comes from the well known Luo-Rudnick-Sarnak bound for the Hecke roots of Π , applied to certain Rankin-Selberg L -functions of positive type, but the key new ingredient here is the use of base change and descent along suitable families of p -power extensions arising as nested sequences of cyclic p^2 -extensions.

5. “Local Langlands correspondence and exterior and symmetric square root numbers for $GL(n)$:An application of generalized Shalika germ expansions” by Freydoon Shahidi (Purdue).

Abstract: This talk is based on a joint work with J. Cogdell and T-L. Tsai in which we sketch a proof of the equality of the Artin root numbers attached to the exterior square and symmetric square of a continuous n -dimensional representation of the Weil-Deligne group with the root numbers defined by our method attached to the same representations of $GL(n, \mathbb{C})$, the L -group of $GL(n)$, and the irreducible admissible representation of $GL(n, F)$ attached by the local Langlands correspondence to the representation of the Weil-Deligne group. Here F is any local field of characteristic zero. The equality for the corresponding L -functions is due to Henniart. The proof is a deformation argument for two root numbers mixed by stability under highly ramified twists which is now available, but a priori, only for supercuspidals which can be established using asymptotics of Bessel functions as a generalized Shalika germ expansion for $GL(n)$ as established by Jacquet and Ye, as in Tsai's thesis. One also needs to use stability for Artin factors due to Deligne and Henniart as well as Harris's local-global arguments in his 1998 Inventiones paper. The stability of these factors for any irreducible admissible generic representation of $GL(n, F)$ then follows.

6. "The existence of Bessel functionals for $GS(4)$ " by Ramin Takloo-Bighash (UIC).

Abstract: In this talk I will explain some results joint with Dipendra Prasad on the existence of Bessel functionals for $GS(4)$. This work was motivated by a question of Shalika in 2002.

7. "Height zeta functions of compactifications of unipotent groups" by Yuri Tschinkel (NYU).

Abstract: I will discuss joint work with Shalika on applications of harmonic analysis on adelic unipotent groups to a problem in arithmetic geometry.