

**International Colloquium on
Automorphic representations and L-functions**

January 3–11, 2012

Schedule and Abstracts of Talks

**Tata Institute of Fundamental Research
Homi Bhabha Road, Mumbai 400 005**

DAY/DATE	9.30 a.m.-10.30 a.m.		11.00 a.m.-12.00 p.m.	12.10 - 13.10 p.m.	L	2.30 - 3.30 p.m.		4.00 - 5.00 p.m.	Special Events
Jan.03 Tuesday	Ram Murty ^{@@}	T	R. Munshi ^{@@}	A. Raghuram ^{@@}	U	M. Hanzer ^{@@}	T	G. Savin ^{@@}	Dinner Party at 7.00 p.m.
Jan.04 Wednesday	Jim Arthur ^{@@}	E	Jim Arthur ^{@@}	E. Lapid ^{@@}	N	W. Kohnen ^{@@}	E	D. Goldfeld ⁺⁺	
Jan.05 Thursday	M. Rapoport ^{@@}	A	J-K. Yu ^{@@}	M. Tadic ^{@@}	C	N. Anantharaman ^{@@}	A	W. Luo ^{@@}	Dance Program at 6.00 p.m.
Jan.06 Friday	B-C. Ngo ^{@@}	B	S. Morel ^{@@}	W. Zhang ^{@@}	H	E. Urban ^{@@}	B	K. Srinivas ⁺⁺	Dinner at Joss at 7.30 p.m.
Jan.07 Saturday	Manjul Bhargava ^{@@}	R	B. Gross ^{@@}	A. Ichino ^{@@}	B	E. Ghate ^{@@}	R	J. Hoffstein ^{@@}	
Jan.09 Monday	D. Ramakrishnan ^{@@}	E	R. Holowinsky ^{@@}	Zhu Chengbo ^{@@}	R	V. Blomer ^{@@}	E	A. Saha ^{@@}	Dinner in West Lawn at 7.30 p.m
Jan.10 Tuesday	D. Rohrlich ^{@@}	A	W.T. Gan ^{@@}	A. Reznikov ^{@@}	E A	O. Offen ^{@@}	A	Y. Sakellaridis ^{@@}	Music Concert Aslam Khan at 6.00 p.m
Jan.11 Wednesday	H. Kim ^{@@}	K	Jeffrey Adams ^{@@}	P. Michel ^{@@}	K	Xiaoqing Li ^{@@}	K	FREE	

The lectures will be held in Lecture Room (AG-69)⁺⁺ & Lecture Theatre (AG-66)^{@@}

**Special Event: Public Lecture by B. Gross on, Friday, 6 January, 2012
Time: 5:15 PM, Venue: Homi Bhabha Auditorium.**

Title of Talks

Ram Murty	<i>The Fibonacci zeta function.</i>
R. Munshi	<i>Bounds for L-functions</i>
A. Raghuram	<i>Cohomology of arithmetic groups and the special values of automorphic L-functions.</i>
M. Hanzer	<i>Explicit construction of automorphic representations of symplectic group with given quadratic unipotent Arthur parameter.</i>
G. Savin	<i>Siegel modular forms of half-integral weight: Hecke operators at $p = 2$.</i>
Jim Arthur	<i>The Endoscopic Classification of Representations.</i>
E. Lapid	<i>Whittaker-Fourier coefficients of cuspidal representations on Mp_{2n}.</i>
W. Kohnen	<i>Generalized modular functions and their Fourier coefficients.</i>
D. Goldfeld	<i>The distribution of low lying zeros for the family of adjoint L-functions on $GL(3)$.</i>
M. Rapoport	<i>On the arithmetic fundamental lemma of Wei Zhang.</i>
J-K. Yu	<i>Epipelagic representations and invariant theory</i>
M. Tadic	<i>On interaction between harmonic analysis and theory of automorphic forms.</i>
N. Anantharaman	<i>Quantum limits on locally symmetric spaces.</i>
W. Luo	<i>Asymptotic Variance for Linnik Distribution.</i>
B-C. Ngo	<i>Kloosterman sheaves for reductive groups.</i>
S. Morel	<i>Mixed l-adic complexes on varieties over \mathbb{Q}</i>
W. Zhang	<i>Global Gan-Gross-Prasad conjecture for unitary groups.</i>
E. Urban	<i>To be announced</i>
K. Srinivas	<i>On the zeros of Selberg class functions.</i>
Manjul Bhargava	<i>The average rank of elliptic curves.</i>
B. Gross	<i>The average order of the 2-Selmer group for hyperelliptic curves.</i>
A. Ichino	<i>Periods of quaternionic Shimura varieties.</i>
E. Ghate	<i>Local semisimplicity over totally real fields.</i>
J. Hoffstein	<i>Multiple Dirichlet series and shifted convolutions.</i>
D. Ramakrishnan	<i>Comparison of cusp forms on $GL(n)$ agreeing at degree one primes.</i>
R. Holowinsky	<i>First moments of Rankin-Selberg Convolutions.</i>
Zhu Chengbo	<i>Degenerate principal series of real classical groups.</i>
V. Blomer	<i>Applications of the Kuznetsov formula on $GL(3)$.</i>

- A. Saha** *Determination of modular forms by Fourier coefficients.*
- D. Rohrlich** *Self-dual Artin representations.*
- W.T. Gan** *A conjecture of Sakellaridis-Venkatesh on the unitary spectrum of spherical varieties.*
- A. Reznikov** *Torus periods of automorphic functions and meromorphic continuation of certain Dirichlet Series.*
- O. Offen** *On representations of $Sp(2n)$ distinguished by $Sp(n) \times Sp(n)$.*
- Y. Sakellaridis** *Beyond Endoscopy for the Relative Trace Formula.*
- H. Kim** *Logarithmic derivatives of Artin L-functions at $s = 1$.*
- Jeffrey Adams** *Automorphisms of spaces of representations*
- P. Michel** *To be announced*
- Xiaoqing Li** *Voronoi formulas and applications*

Title of Talks

Tuesday, 3 January 2011 (9.30-10.30)

Speaker : Ram Murty
Title : **The Fibonacci zeta function.**

The Fibonacci zeta function is the sum of the reciprocals of the s -th powers of the Fibonacci numbers. It is conjectured that the values of this zeta function are transcendental when s is a natural number are transcendental. I will discuss the status of this conjecture and report on what is known and what is unknown. Surprisingly, the unknown cases lead one to the study of q -analogues of the Riemann zeta function that appear in Ramanujan's work.

Tuesday, 3 January 2012 (11.00-12.00)

Speaker : R. Munshi
Title : **Bounds for L-functions.**

In this talk I will discuss some new results on subconvexity of some higher degree L-functions.

Tuesday, 3 January 2012 (12.10-1.10)

Speaker : A. Raghuram
Title : **Cohomology of arithmetic groups and the special values of automorphic L -functions.**

In the first part of my talk, I will begin by recalling some classical results of Manin and Shimura on the rationality properties of critical values of L -functions for holomorphic Hilbert modular cusp forms. After recasting these results in the language of automorphic representations, I will give an overview of some recent results, obtained in collaboration with Harald Grobner, on the rationality properties of the critical values of L -functions for $GL(n)$ over a totally real number field. The second part of my talk will be a summary of the proofs, which in turn may be viewed as a general introduction to some number theoretic applications of the cohomology of arithmetic groups.

Tuesday, 3 January 2012 (2.30-3.30)

Speaker : M. Hanzer

Title : Explicit construction of automorphic representations of symplectic group with given quadratic unipotent Arthur parameter.

Using inductive procedure, we explicitly realize (in the space of square-integrable automorphic forms) an automorphic representation of a symplectic group (of an appropriate size) with the prescribed quadratic unipotent Arthur parameter. This procedure resembles the Mœglin-Tadić construction of the discrete series representations of classical groups in the local case; in the case of automorphic representations it uses the degenerate Eisenstein series to explicitly realize the representations in question in space of square-integrable automorphic forms (as in an earlier work of Gelbart, Piatetski-Shapiro and Rallis, and in more recent work by Muić). We also use Arthur's work on local packets and work of Kim and Shahidi on residual spectrum of symplectic groups.

Tuesday, 3 January 2012 (4.00-5.00)

Speaker : G. Savin

Title : Siegel modular forms of half-integral weight: Hecke operators at $p = 2$.

It is well known that classical integral weight modular forms for $SL_2(\mathbb{Z})$ correspond to automorphic representations of $GL(2)$, unramified at all finite places. This dictionary becomes considerably complicated once we allow ramified representations at finite places and leads to the theory of new forms. The situation is even more complicated for half-integral weight modular forms as there is no notion of unramified representations at $p = 2$.

Wednesday, 4 January 2012 (9.30-10.30)

Speaker : Jim Arthur

Title : The Endoscopic Classification of Representations.

I will describe a classification of the automorphic representations of special orthogonal or symplectic groups G in terms of those of general linear groups $GL(N)$. This necessarily includes a classification of local L-packets of representations of G , as well as the extended packets that are the local constituents of nontempered automorphic representations. The methods, both local and global, rest on a twofold comparison of trace formulas. One is between the twisted trace formula for $GL(N)$ and the stable trace formulas for the various G , and the other is between the trace formula for G and the stable trace formulas for the various endoscopic groups of G . If time permits, I will try to give some idea of these comparisons.

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Wednesday, 4 January 2012 (12.10-1.10)

Speaker : E. Lapid

Title : Whittaker-Fourier coefficients of cuspidal representations on Mp_{2n} .

The generic spectrum of classical groups is furnished by the descent method of Ginzburg-Rallis-Soudry. We analyze the connection, ?? la Waldspurger/Ichino-Ikeda, between Whittaker-Fourier coefficients and matrix coefficients and study an ensuing local question. Joint work with Zhengyu Mao.

Wednesday, 4 January 2012 (2.30-3.30)

Speaker : W. Kohnen

Title : Generalized modular functions and their Fourier coefficients.

Generalized modular functions are holomorphic functions on the complex upper half-plane, meromorphic at the cusps, that satisfy the usual transformation formula of a classical modular function, however with the important exception that the character need not be of finite order or unitary. The theory has been partly motivated from conformal field theory in Physics. I intend to report on recent joint work with G. Mason on the Fourier coefficients of such forms.

Wednesday, 4 January 2012 (4.00-5.00)

Speaker : D. Goldfeld

Title : The distribution of low lying zeros for the family of adjoint L -functions on $GL(3)$.

Katz and Sarnak have conjectured that the distribution of low lying zeros of a general family of L -functions must be the same as the distribution of eigenvalues

near 1 of a random matrix ensemble in a classical compact group. The classical group in question is also referred to as the symmetry type for the associated family. We will show that for the family of adjoint L-functions on $GL(3)$ the symmetry type is symplectic. This is joint work with Alex Kontorovich.

Thursday, 5 January 2012 (9.30-10.30)

Speaker : M. Rapoport

Title : On the arithmetic fundamental lemma of Wei Zhang.

This concerns the arithmetic analogue of the Fundamental Lemma arising in the Relative Trace Formula approach to the Gross-Prasad conjecture of Jacquet/Rallis. The Fundamental Lemma is a strikingly simple relation between certain orbital integrals on unitary groups and certain weighted orbital integrals on p -adic symmetric spaces (or, alternatively, between two lattice counting formulas). The Arithmetic Fundamental Lemma relates the derivatives of the latter weighted orbital integrals with arithmetic intersection numbers of cycles on formal moduli spaces of p -divisible groups. Its statement was conjectured by Wei Zhang who also proved it in low dimension. In recent joint work with Ulrich Terstiege and Wei Zhang I proved a result in this direction in arbitrary dimension.

I will explain the FL conjecture and the AFL conjecture, and then comment on the evidence for these conjectures.

Thursday, 5 January 2012 (11.00-12.00)

Speaker : J-K. Yu

Title : Epipelagic representations and invariant theory

Thursday, 5 January 2012 (12.10-1.10)

Speaker : M. Tadic

Title : On interaction between harmonic analysis and theory of automorphic forms.

Some very important problems of modern theory of automorphic forms are typical problems of non-commutative harmonic analysis (in a broad sense). From the other side, in building harmonic analysis on reductive groups, automorphic forms are very useful. They are very rich source of relevant ideas, as well as crucial representations and concepts. In the talk we shall review some of these connections.

Thursday, 5 January 2012 (2.30-3.30)

Speaker : **N. Anantharaman**

Title : **Quantum limits on locally symmetric spaces.**

We prove lower bounds for the entropy of limit measures associated to non-degenerate sequences of eigenfunctions on locally symmetric spaces of non-positive curvature. In the case of certain compact quotients of the space of positive definite $n \times n$ matrices (any quotient for $n = 3$, quotients associated to inner forms in general), measure classification results then show that the limit measures must have a Haar component. This is consistent with the conjecture that the limit measures are absolutely continuous. (Joint work with L. Silberman).

Thursday, 5 January 2012 (4.00-5.00)

Speaker : **W. Luo**

Title : **Asymptotic Variance for Linnik Distribution.**

It is well-known that the closed geodesics on the modular surface X , when collected according to the discriminants, are equidistributed with respect to the hyperbolic invariant measure. This is the famous Linnik problem, solved in 1987 in the works of Duke and Iwaniec on bounding the Fourier coefficients of half-integral weight modular forms. We study and evaluate asymptotically the variance of this distribution on the unit tangent bundle of X , and show it is equal to the classic variance of the geodesic flow à la Ratner, but twisted by an intriguing arithmetic invariant, the central value of certain L-function. Our approach makes use of the work of Shintani on Weil representation and the theta correspondence. We also obtain analogous result for the variance in the Linnik distribution of integer points on spheres, via Jacquet-Langlands correspondence and Yoshida lift.

Friday, 6 January 2012 (9.30-10.30)

Speaker : **B-C. Ngo**

Title : **Kloosterman sheaves for reductive groups.**

This is a joint work with J. Heinloth and Z. Yun.

Deligne constructed a remarkable local system on $\mathbf{P}^1 - \{0, \infty\}$ attached to a family of Kloosterman sums. Katz calculated its monodromy and asked whether there are Kloosterman sheaves for general reductive groups and which automorphic forms should be attached to these local systems under the Langlands correspondence. Motivated by work of Gross and Frenkel-Gross we find an explicit family of such automorphic forms and even a simple family of automorphic sheaves in the framework of the geometric Langlands program. We use these automorphic sheaves to construct l -adic Kloosterman sheaves for any reductive group in a uniform way, and describe the local and global monodromy of these Kloosterman sheaves. In particular, they give motivic Galois representations with exceptional monodromy groups G_2 , F_4 , E_7 and E_8 .

Friday, 6 January 2012 (11.00-12.00)

Speaker : **S. Morel**

Title : **Mixed l -adic complexes on varieties over Q**

If X is a variety over Q (or any global field), Annette Huber has defined a category of mixed l -adic complexes that have good reduction at almost every place. However, unlike what happens in the case of varieties over a finite field, mixed perverse sheaves don't admit a weight filtration in general. I will explain what causes this problem and a way around it.

Friday, 6 January 2012 (12.10-1.10)

Speaker : **W. Zhang**

Title : **Global Gan-Gross-Prasad conjecture for unitary groups**

We confirm the global Gan–Gross–Prasad conjecture for unitary groups under some local restrictions for the automorphic representations. We also obtain some result towards the Flicker–Rallis conjecture characterizing the image of weak base change from any unitary group via distinction by the general linear subgroup.

Friday, 6 January 2012 (2.30-3.30)

Speaker : **E. Urban**

Title : **To be announced**

To be announced.

Friday, 6 January 2012 (4.00-5.00)

Speaker : **K. Srinivas**

Title : **On the zeros of Selberg class functions.**

We shall discuss some recent results on the zeros of functions in the Selberg class.

Saturday, 7 January 2012 (9.30-10.30)

Speaker : **Manjul Bhargava**

Title : **The average rank of elliptic curves.**

It is now a standard conjecture, originating in work of Goldfeld and Katz–Sarnak, that the *average* rank of all elliptic curves over \mathbb{Q} should be $1/2$; however, it has not previously been known that the average rank is even finite. In this lecture, we describe recent work that shows that the average rank is finite (in fact, we prove that the average rank is less than 1). We accomplish this by determining the average order of the n -Selmer group of all elliptic curves for certain small values of n . This is joint work with Arul Shankar.

Saturday, 7 January 2012 (11.00-12.00)

Speaker : **B. Gross**
Title : **The average order of the 2-Selmer group for hyperelliptic curves.**

Let p be a prime. Heuristics suggest that the average order of the p -Selmer group, taken over all elliptic curves over \mathbb{Q} , is equal to $p + 1$. Bhargava and Shankar have recently established this result for $p = 2, 3$, and 5 . They identify integral orbits in certain linear representations of algebraic groups with classes in the Selmer group, then count these orbits using the geometry of numbers. I will present a generalization of this result, which is joint work with Manjul Bhargava, showing that the average order of the 2-Selmer group, for the Jacobians of hyperelliptic curves of a fixed genus $n \geq 1$ over \mathbb{Q} with a rational Weierstrass point, is equal to 3. The relevant representation is the symmetric square of the standard representation of the split orthogonal group SO_{2n+1} .

Saturday, 7 January 2012 (12.10-1.10)

Speaker : **A. Ichino**
Title : **Periods of quaternionic Shimura varieties.**

We report a work in progress on Petersson inner products of automorphic forms on inner forms of $PGL(2)$. This is a joint work with Kartik Prasanna.

Saturday, 7 January 2012 (2.30-3.30)

Speaker : **E. Ghate**
Title : **Local semisimplicity over totally real fields.**

We show how the recent modularity theorems due to Sasaki, Kassaei and others for Artin-like Galois representations of totally real fields can be harnessed to understand the semisimplicity of the local Galois representations attached to ordinary Hilbert modular cusp forms of parallel weight at least 2. This is joint work with B. Balasubramanyam.

Saturday, 7 January 2012 (4.00-5.00)

Speaker : **J. Hoffstein**
Title : **Multiple Dirichlet series and shifted convolutions.**

I'll define, and describe how to obtain the meromorphic continuation of, shifted Rankin-Selberg convolutions in one, two and three variables. I'll also describe some applications, such as a Burgess-type bound for L -series associated to modular forms of arbitrary central character and mean value estimate for the second moment of twists of these L -series by Dirichlet characters modulo Q , averaged over Q in a short interval.

Monday, 9 January 2012 (9.30-10.30)

Speaker : D. Ramakrishnan

Title : Comparison of cusp forms on $GL(n)$ agreeing at degree one primes.

Let K/F be a finite Galois extension of number fields. It is well known that the Tchebotarev density theorem implies that an irreducible ell-adic representation R of the absolute Galois group of K is determined (up to equivalence) by the characteristic polynomials of Frobenius elements at any set of primes P of degree 1 over F . This talk will discuss the analogue for $GL(n)$, asking if a cuspidal automorphic representation π of $GL(n, A_K)$ is determined up by the knowledge of its local components at the degree one primes. We will first explain how to prove it up to twist equivalence for K/F cyclic of prime degree, before discussing the general case. The method uses, besides the Rankin-Selberg theory of L -functions and the Luo-Rudnick-Sarnak bound for the Hecke roots of π , certain consequences of class field theory.

Monday, 9 January 2012 (11.00-12.00)

Speaker : R. Holowinsky

Title : First moments of Rankin-Selberg Convolutions.

We will discuss first moment methods for Rankin-Selberg convolution L -functions in application to the subconvexity problem. In particular, for f and g two independently varying $GL(2)$ forms, we will consider the convolutions $L(\frac{1}{2}, f \times g)$ and $L(\frac{1}{2}, \text{sym}^2 f \times g)$. This talk is based on joint works with N. Templier and R. Munshi.

Monday, 9 January 2012 (12.10-1.10)

Speaker : Zhu Chengbo

Title : Degenerate principal series of real classical groups.

I will survey (precise) structures of certain classes of degenerate principal series representations of real classical groups. The main interests for these representations come from the theory of automorphic forms (e.g. work of Kudla and Rallis, and Ichino, on Siegel-Weil Formula and their extensions). A second purpose of the talk is to explain how Howe quotient correspondence sheds light on the structure of these representations, and vice versa. By coincidence, most of the works to be discussed were done at my university (by Lee, Loke, and myself, and various combinations).

Monday, 9 January 2012 (2.30-3.30)

Speaker : V. Blomer

Title : Applications of the Kuznetsov formula on $GL(3)$.

To be announced.

Monday, 9 January 2012 (4.00-5.00)

Speaker : A. Saha

Title : Determination of modular forms by Fourier coefficients.

It is an interesting question when a natural subset of the Fourier coefficients are sufficient to uniquely determine a modular form. I will describe recent work that investigates this question for classical holomorphic cusp forms of half-integral weight and Siegel cusp forms of genus 2 — two apparently very different scenarios that turn out to be closely related. This work is motivated by the fact that Fourier coefficients of Siegel cusp forms of degree 2 are simultaneously Bessel periods and (conjecturally) central L -values; as a result the results have important consequences for global Bessel models, functoriality and L -functions associated to Siegel forms. Moreover, an application of the main result to the case of special Siegel forms called Yoshida lifts leads to a simultaneous non-vanishing theorem for dihedral twists of two modular L -functions. Part of this is joint work with Ralf Schmidt.

Tuesday, 10 January 2012 (9.30-10.30)

Speaker : D. Rohrlich

Title : Self-dual Artin representations.

Our motivating question is whether self-dual L -functions — those for which the functional equation relates the L -function to itself — have density zero among all L -functions. For the sake of a precise formulation we focus on Artin L -functions, and we replace the L -functions by the representations underlying them. Thus we fix a number field F and an integer $n \geq 1$, and we write $\vartheta_{F,n}(x)$ for the number of isomorphism classes of n -dimensional complex representations of $\text{Gal}(\overline{F}/F)$ with conductor $\leq x$. Let $\vartheta_{F,n}^{\text{sd}}(x)$ be the number of such classes that are self-dual. In its crudest form, our problem is to determine whether $\lim_{x \rightarrow \infty} \vartheta_{F,n}^{\text{sd}}(x)/\vartheta(x)_{F,n} = 0$. If $F = \mathbb{Q}$ and $n = 1$ then the answer is affirmative, and in fact it is easy to see that the quotient at issue is asymptotic to $\pi^2/(3x)$. Using recent work of Bhargava and of Bhargava and Cojocaru, we shall prove that the answer is also affirmative for $F = \mathbb{Q}$ and $n = 2$.

Tuesday, 10 January 2012 (11.00-12.00)

Speaker : **W.T. Gan**

Title : **A conjecture of Sakellaridis-Venkatesh on the unitary spectrum of spherical varieties.**

Sakellaridis and Venkatesh have stated a conjecture which describes the spectral decomposition of a spherical variety in terms of the Plancherel measure of an associated dual group. In joint work with Raul Gomez, we demonstrated this conjecture for many spherical varieties of low rank by exploiting the theory of theta correspondence in the unitary setting.

Tuesday, 10 January 2012 (12.10-1.10)

Speaker : **A. Reznikov**

Title : **Torus periods of automorphic functions and meromorphic continuation of certain Dirichlet Series.**

: We consider modular functions (i.e., the Eisenstein series and Hecke-Maass forms) for the group $PSL(2, Z)$. We fix a quadratic number field E . This gives rise to twisted (by a Hecke character of the field E) periods of a modular form along the corresponding to E torus. We prove meromorphic continuation for a Dirichlet series generated by these twisted periods.

Tuesday, 10 January 2012 (2.30-3.30)

Speaker : **O. Offen**

Title : **On representations of $Sp(2n)$ distinguished by $Sp(n) \times Sp(n)$.**

A cuspidal automorphic representation π of G is distinguished by a subgroup H if the period integral over H is not identically zero on π . For general automorphic representations the period integral need not converge. We introduce a notion of *the H -distinguished automorphic spectrum of G* and provide an upper bound for it in the case $(G, H) = (Sp(2n), Sp(n) \times Sp(n))$. The motivation comes from analyzing the image of the descent map of Ginzburg-Rallis-Soudry from $GL(2n)$ to $Mp(n)$. This is joint work with Erez Lapid.

Tuesday, 10 January 2012 (4.00-5.00)

Speaker : **Y. Sakellaridis**

Title : **Beyond Endoscopy for the Relative Trace Formula.**

I will present a new proof of the celebrated result of Waldspurger periods of GL_2 -automorphic forms, based on a non-standard comparison of relative trace formulae.

Wednesday, 11 January 2012 (9.30-10.30)

Speaker : **H. Kim**

Title : **Logarithmic derivatives of Artin L -functions at $s = 1$.**

Logarithmic derivatives of Artin L -functions were studied extensively by Y. Ihara and K. Murty and others under GRH. Let K be a number field of degree n , and d_K be its discriminant. Then under the Artin conjecture, GRH and certain zero density hypothesis, we show that the upper and lower bound of the logarithmic derivative of Artin L -function attached to K at $s = 1$ are $\log \log |d_K|$ and $-(n-1) \log \log |d_K|$, resp. We show that under the strong Artin conjecture (without GRH) and several conjectures, there are infinitely many number fields with the extreme logarithmic derivatives. We exhibit families of number fields whose Galois closures have the Galois group as C_n , $2 \leq n \leq 6$, D_n , $n = 3, 4, 5$, S_4 , and A_5 , where all the conjectures hold. This is a joint work with P.J. Cho.

Wednesday, 11 January 2012 (11.00-12.00)

Speaker : **Jeffrey Adams**

Title : **Automorphisms of spaces of representations**

Consider automorphisms of the set of admissible representations of G , and the corresponding automorphism of the space of Langlands parameters. A number of interesting phenomenon fall under this rubric. Examples include the contragredient and the Hermitian dual. Of particular importance is a new construction known as the c -Hermitian dual, which plays an key role in the study of unitary representations. On the dual side we consider both algebraic and conjugate-linear automorphisms of the L -group. I'll discuss these questions over both archimedean and non-archimedean local fields.

Wednesday, 11 January 2012 (12.10-1.10)

Speaker : **P. Michel**

Title : **To be announced**

To be announced.

Wednesday, 11 January 2012 (2.30-3.30)

Speaker : **Xiaoqing Li**

Title : **Voronoi formulas and applications**

In this talk, we will introduce a very useful tool — Voronoi formulas on $GL(n)$ and explain its applications to L -functions on higher rank groups.