CONFERENCE ON "AUTOMORPHIC FORMS ON METAPLECTIC FORMS AND RELATED TOPICS "

IISER PUNE

JULY 4-9, 2016

ABSTRACTS

(1) **Speaker:** Siegfried Bocherer

Title: Relations between Laplace operators acting on Siegel modular forms, Jacobi forms and modular forms of half-integral weight

Abstract: Laplace operators for Siegel modular forms act in a canonical way also on Jacobi forms. One can express this action intrisically by Laplace operators on the Jacobi group; these Jacobi-Laplace operators are quite complicated. Things become easy again when one goes from Jacobi forms to modular forms of half-integral weight. These considerations can be used to compute a Rankin-Selberg convolutions of Kohnen-Skoruppa-type in the case of noncuspidal forms (part of joint work with S.Das).

(2) **Speaker:** Yuanqing Cai

Title: Fourier Coefficients for Generalized Theta Representations

Abstract: Kazhdan and Patterson constructed generalized theta representations on covers of general linear groups as multi-residues of the Borel Eisenstein series. These representations and their unique models play important roles in the Rankin-Selberg constructions of the symmetric square L-functions for GL(r). In this talk, we will discuss the two other types of models that the theta representations may support. We also determine the covers when these models are unique. Time permitting, we will discuss some applications in Rankin-Selberg constructions.

(3) **Speaker:** Zhu Chengbo

Title: Local theta lifting of generalized Whittaker models

Abstract: I will explain a previous work of mine with Raul Gomez on the lifting of generalized Whittaker models in the setting of dual pair correspondence. The geometry of moment maps will be emphasized.

(4) **Speaker:** Soumya Das

Title: Fourier Jacobi coefficients of Siegel modular forms.

Abstract: Fourier Jacobi expansions of Siegel modular forms is an useful tool and has many applications. In this talk I would discuss these objects both for cusp forms and Eisenstein series, and about Petersson inner products of such coefficients. Some applications to representation numbers of quadratic forms would be discussed. This is part of joint work with S. Boecherer.

(5) **Speaker:** Eknath Ghate

Title: Reductions of Galois Representations of Small Slopes

Abstract: We investigate the shape of the reductions of certain crystalline representations of the Galois group of $\mathbb{Q}_p$. The answer is now essentially completely known for slopes less than 2, thanks to joint work with Bhattacharya for slopes in the range (1,2) and also with Rozensztajn for slope 1. This builds on earlier work of Breuil for small weights and of Buzzard-Gee for slopes in the range (0,1).

The proof uses the compatibility between the mod p and p-adic Local Langlands Correspondences with respect to the process of reduction, and reduces to a delicate harmonic analysis problem on the Bruhat-Tits tree.

(6) **Speaker:** Jeffrey Hoffstein

Title: A survey of GL(2) metaplectic theta functions

Abstract: I will explain what is presently known about theta functions on the n-fold cover of GL(2). These are generalizations to $n > 2$ of the $n = 2$ Jacobi theta function. Surprisingly little is known definitively about them but they are in some cases known, and in other cases conjectured, to have some very interesting arithmetic characteristics and applications. I will try to explain why these are worthy of interest, and give some examples of known applications and conjectured applications.

(7) **Speaker:** Tomoyoshi Ibukiyama

Title: Conjectures on Shimura type correspondence of degree two and Harder's conjecture.

Abstract: Based on dimensional coincidence and numerical examples, we will give two precise conjectures on correspondence between holomorphic Siegel cusp forms of degree two preserving L functions. One is between the plus subspace (level one part) of vector valued Siegel cusp forms of degree two of "half-integral weight" with trivial character (Haupt type) and with character (Neben type) up to some liftings. The other is on Shimura type correspondence of "integral weight" and "half-integral weight" of level one. Applying these conjectures, we give a half-integral version of Harder's conjecture on congruence on vector valued Siegel cusp forms of integral weight and elliptic cusp form, and also give a concrete proved example.

(8) **Speaker:** Winfried Kohnen

Title: Fourier coefficients of half-integral weight cusp forms: old and new results

Abstract: We will survey several results on Fourier coefficients of half-integral weight cusp forms, both classical (like Waldspurger's theorem) and more recent ones (like sign changes, characterization of cups forms by growth of Fourier coefficients etc.)

(9) **Speaker:** Wen-Wei Li

Title: Harmonic analysis on metaplectic coverings

Abstract: I will present some basic results concerning harmonic analysis on general coverings, including those arising from the Brylinski-Deligne central extensions. Emphasis will be placed on the parts that involve "metaplectic-ness" and require extra techniques. A discussion about trace formula in the global case and some digressions on stable conjugacy will also be included, if time permits.

(10) **Speaker:** Ameya Pitale

Title: Restrictions of Hilbert Eisenstein series

Abstract: Tonghai Yang (2005) constructed Hilbert Eisenstein series of weight (1,1) giving criteria for non-vanishing and explicit Fourier coefficients. He conjectured that if we considered certain families of these Hilbert Eisenstein series and restricted them to the complex upper half plane, then the restrictions span the space of all modular forms of weight 2 and level N. We present the progress towards this conjecture. In particular, we consider the adelic integral of the restriction of the Eisenstein series against a GL(2) cusp form and obtain criteria for its non-vanishing in terms of non-vanishing of related central L-values. This is joint work with Rodney Keaton and Yingkun Li.

(11) **Speaker:** Dipendra Prasad

Title: Branching laws for certain metaplectic covers

Abstract: This talk will be an exposition of the work of my student Shiv Prakash Patel who considered branching laws for the two-fold metaplectic cover of GL(2,E) to GL(2,F) as well as to D*, where E/F is a quadratic extension of local fields, and D is a quaternion division algebra over F. This work was done in analogy with a similar question for linear groups where there are rather nice answers, and multiplicity one theorems, which unfortunately do not hold good for the metaplectic situation.

(12) **Speaker:** Beth Romano

Title: On the Local Langlands Correspondence: New Examples from the Epipelagic Zone

Abstract: The conjectural local Langlands correspondence (LLC) can be thought of as a generalization of local class field theory: given a split reductive group G over a finite extension k of $\mathbb{Q}_p$, it predicts that every irreducible supercuspidal representation of G(k) should correspond to a finite, Galois field extension of k, uniquely characterized in some way. The LLC has been proven in many cases for large primes p, but remains mysterious when p is small. Building on work of Reeder-Yu, Jessica Fintzen and I have found new supercuspidal representations for small p, each of which should correspond to a wildly ramified field extension. In my talk, I will describe both representations and corresponding field extensions for the case when $G = G_2$.

(13) **Speaker:** Shuichiro Takeda

Title: Metaplectic tensor product and functoriality

Abstract: For the Kazhdan-Patterson covering of GL(n), it is highly non-trivial, both locally and globally, to construct a representation of the Levi subgroup by using representations of the covering groups of the smaller rank GL(n)'s, while the analogous construction is highly trivial for the non-covering case. This construction, which we call the metaplectic tensor product, was carried out by Mezo for the local case, and by myself for the global case. In this talk, we will first recall the construction of the metaplectic tensor product and then explain how it can be interpreted as a "functorial transfer" within the framework of Weissman's L-groups for covering groups. This is partially a joint work with W. T. Gan.

(14) **Speaker:** Martin Weissman

Talk 1

Title: A motivated introduction to Brylinski-Deligne extensions,

Abstract:

Following Steinberg and Matsumoto, I will review the theory of Chevalley groups over a field F and their central extensions. This culminates in the result that – in a wide set of circumstances – the kernel in the universal extension is the group $K_2(F)$. From there, we will proceed through results of Prasad, Rapinchuk, and Deligne, to motivate the definition by Brylinski and Deligne of a "central extension of a reductive group by K_2". I will discuss a resulting notion of "covering group" and some of the advantages that I see in working in this framework.

Talk 2

Title: Covers of tori and their representations

Abstract: In 1968, Langlands worked out the representation theory of tori over local and global fields (unitary and automorphic representations, respectively). This result constrained and guided Langlands' conjectures for reductive groups. It is reasonable to expect that an understanding of central extensions of tori by K_2 will constrain and guide an extension of Langlands' conjectures to covers of reductive groups.

In this lecture, I will describe the central extensions of tori by K_2, with concrete examples for split tori and compact real tori. From their structure theory, I will move into the genuine representation theory of covers of tori. Finally, I will discuss the

Langlands parameterization for covers of split tori, and open questions for nonsplit tori.

Talk 3

Title: Covers of reductive groups and the L-group

Abstract: I will discuss the classification, by Brylinski and Deligne, of central extensions of reductive groups by K_2. They are classified by a triple of invariants, (Q, D, f), related to the root datum of the group. Using this triple, I will construct an L-group which conjecturally parameterizes the genuine smooth irreducible (or automorphic, in the global setting) representations of a covering group. I will discuss results for unramified representations and discrete series and open directions for research.

(15) **Speaker:** Yamana Shunsuke

Title: On certain families of CAP representations for metaplectic and orthogonal groups

Abstract: abstract: Starting from a Hilbert cusp form, I will construct Hilbert-Siegel cusp forms of degree m and some CAP representations of orthogonal groups. When m=1, this is the Shimura correspondence. When m=2, this is the Saito-Kurokawa lifting. Any Hilbert-Siegel cusp form whose local component is degenerate principal series at all the nonarchimedean primes is the lifting of a Hilbert cusp form. This is a joint work with Tamotsu Ikeda.

(16) **Speaker:** Hung Yean Loke

Title: Local Theta Correspondence between supercuspidal representations

Abstract:

By the works of Howe, Yu, Kim and Hakim-Murnaghan, we have a parameterization and construction of all supercuspidal representations of a reductive p-adic group in terms of supercuspidal data when p is sufficiently large. In this talk, we define the theta lifts of supercuspidal data via moment maps and theta correspondences over finite fields. The main result is that local theta correspondences between supercuspidal representations are completely described by this theta lifts of data.

This is a joint project with Jiajun Ma.

(17) **Speaker:** Lei Zhang

Title: Tokuyama-type formulas for characters of type B

Abstract: This is a joint work with Sol. Friedberg. We obtain explicit formulas for the product of a deformed Weyl denominator with the character of an irreducible representation of the spin group $\mathrm{Spin}(2r+1, \mathbb{C})$, which is an analogue of the formulas of Tokuyama for Schur polynomials and Hamel-King for characters of symplectic groups. To give these, we start with a symplectic group and obtain such characters using the Casselman-Shalika formula. We then analyze this using objects which are naturally attached to the metaplectic double cover of an odd orthogonal group.