

INFORMATION: “ANALYTIC NUMBER THEORY AND HIGHER RANK GROUPS.”

The organizers – Dorian Goldfeld, Stephen Miller, and Akshay Venkatesh – would like to gratefully acknowledge the support of the National Science Foundation (through NSF grant 0813445) as well as the Packard Foundation.

ADMINISTRATION

Supported participants should pick up a package of forms from the front of the room – **these differ for US residents and visa holders** – fill in the forms, and return them to Sylvia Mejia (room 911). She is available in the morning break (10:30 – 11), during the lunch break from 12–1, and again during the afternoon break 3–3:30.

- Please have your forms filled out **before** you see Sylvia.
- It is **particularly important for visa holders** to go and see Sylvia since she needs to make copies of your visa and passport documents.

COMPUTER ACCESS

A password for wireless access will be announced at the first lecture (it changes on Sunday night, so was not available at the time of this printing)

SCHEDULE

Timing	Monday	Tuesday	Wednesday	Thursday	Friday
9:30–10:30	Miller (I)	Michel (I)	Miller (I)	Michel	Gan
11:00–12:00	Michel (I)	Miller(I)	Michel(I)	Goldfeld	Sarnak
14:00-15:00	Li	Bhargava	Venkatesh	Reznikov	
15:30 – 16:30	Bump	Farmer	Lindenstrauss	Lapid	
17:00-18:00	Reception	Skinner		TBA	

- All the talks are held in Room 109 of Warren Weaver Hall. This is located at 251 Mercer Street, i.e., Mercer Street between West 3rd and West 4th streets.
- There will be coffee, tea, and cookies etc. available during the morning break. There will be coffee and tea available during the afternoon break. (There are also a number of good coffeeshops nearby, also.)
- The Reception will be held on the 13th floor of Warren Weaver Hall.
- (I) denotes an instructional course.
- The Wednesday session ends at 16:30. The Friday session ends at noon.

TITLES AND ABSTRACTS.

Bhargava: “Class number-regulator summation formulae for cubic fields.”

Bump: “Crystals, Gauss Sums and Multiple Dirichlet Series.” Weyl Group multiple Dirichlet series are Dirichlet series in several complex variables whose coefficients have a twisted multiplicativity that reduces their description to those of their p -parts (though they are not Euler products). The p -parts themselves are extremely interesting. I will describe joint work with Brubaker, Chinta, Friedberg, Gunnells and Hoffstein with the general aim of showing that one may describe such a p -part as a sum over a crystal. Crystals are combinatorial objects introduced by Kashiwara in the context of quantum groups. They are colored directed graphs whose vertices may be parametrized by Young Tableaux or Gelfand-Tsetlin patterns. As a biproduct we will discuss deformations of the Weyl character formula and interesting phenomena involving metaplectic Whittaker functions.

Farmer: “Computing $GL(3)$ L-functions.” I will describe current methods for computing Maass forms on $GL(3)$ and the associated L-functions. Included will be a list of the first several eigenvalues of the Laplacian for $SL(3, \mathbb{Z})$.

Gan : “Non-vanishing of L-values and theta lifts.”

Goldfeld: “The Voronoi summation formula for $GL(n)$.” This talk will be about the Voronoi formula, beginning with the classical one and its derivation using Mellin inversion. It will then be shown how to generalize the proof to obtain a Voronoi formula on $GL(n)$. This is joint work with Xiaoqing Li.

Lapid: “Arthur’s non-invariant trace formula in higher rank and applications”. One of the simplest applications of the trace formula (and the original one due to Selberg) is to Weyl’s law. I’ll explain what is needed for the higher rank case, and in particular explicate the spectral side of Arthur’s trace formula. Joint work with Tobias Finis and Werner Müller.

X. Li: “Triple L-functions in the splitting case.”

Lindenstrauss: “Effective equidistribution and density on the torus.” Given an irrational point $x \in \mathbb{R}/\mathbb{Z}$, Furstenberg has shown that $\{2^n 3^k x \bmod 1 : n, k \geq 1\}$ is dense in \mathbb{R}/\mathbb{Z} . How fast does this happen? One can also consider the related problem of how an orbit of a rational point is distributed in \mathbb{R}/\mathbb{Z} .

Now consider the n torus $\mathbb{T}^n = \mathbb{R}^n/\mathbb{Z}^n$ and let $A, B \in SL(n, \mathbb{Z})$. Suppose e.g. that A and B generate a Zariski dense subgroup of $SL(n)$. Perform a random walk on \mathbb{T}^n by randomly applying A and B to x (and iterating this procedure). If x is irrational this random walk becomes equidistributed (in a quantitative way). This answers a question of Guivarch as well as a question of Furstenberg about stiffness of such actions (a notion I will define in my talk), and is in contrast to the behavior of $2^n 3^k x$ on \mathbb{R}/\mathbb{Z} .

I will explain the two problems and how they relate, as well as their relation to recent results in arithmetic combinatorics, specifically the sum product phenomenon. Based on joint works with Bourgain, Michel, Venkatesh and Bourgain Furman and Mozes.

Michel (instructional lecture series): “Distribution of CM points, subconvexity, and generalizations.”

Michel (research lecture): “Uniform subconvexity for L-functions on $GL(2)$ and global periods.”

Miller (instructional lecture series): "Automorphic distributions and analytic properties of L-functions." This mini-course consists of three lectures on the analytic properties of L-functions, using the technique of automorphic distributions. The course will begin with an overview of $GL(2)$ L-functions and some prominent conjectures and theorems about them. We will then discuss automorphic forms on $GL(n)$ and Langlands' conjectures. Finally, we will describe the technique of changing vectors in an automorphic representation, and some analytic facts that can be obtained from it.

Reception. I will present wine and cheese on the 13th floor of the Courant Institute. Proofs will not be provided.

Reznikov: "On Rankin-Selberg identities."

Skinner: To be announced.

Sarnak: To be announced.