

## Spring 2020

**All remaining Arithmetic Seminar talks are cancelled/postponed. Some of the talks may be rescheduled in the online format, if the speaker is willing and able to do it.**

**January 28**

**Speaker:** N/A

**Title:** Organizational Meeting

**Abstract:** We will discuss schedule and speakers for this semester

**February 4**

**Speaker:** Fikreab Admasu (Binghamton University)

**Title:** Buildings with examples

**Abstract:** This talk will be an introduction to buildings with examples. Jacques Tits introduced the notion of buildings to provide a systematic geometric description of certain groups such as finite simple groups. They have found applications in several other areas. We will look at some examples such as affine buildings and finite projective planes.

**February 11**

**Speaker:** Fikreab Admasu (Binghamton University)

**Title:** Buildings and an application

**Abstract:** In this second talk, we will look at the construction of buildings such as spherical buildings. One application of buildings, due to Igusa, M. du Sautoy and A. Lubotzky is that the local factors of the zeta function of a class of nilpotent groups is expressed in terms of the combinatorics of the building of the associated algebraic group.

**February 18**

**Speaker:** Alexander Borisov (Binghamton University)

**Title:** Lehmer's Conjecture and Dimitrov's proof of Schinzel-Zassenhaus Conjecture

**Abstract:** Mahler measure  $M(f)$  of a univariate monic integer polynomial  $f$  is the product of absolute values of its complex roots outside of the unit circle. A long-standing conjecture, known as Lehmer's Conjecture, asserts that there is a positive constant  $C$ , such that  $M(f)$  either equals 1 or is at least  $1+C$ . A somewhat weaker conjecture, due to Schinzel and Zassenhaus, says that for some positive  $C$ , independent of the degree  $d$  of the polynomial  $f$ , the maximum absolute value of roots of  $f$  either equals 1 or is at least  $1+C/d$ . In a very recent breakthrough development the proof of this weaker conjecture was announced by Vesselin Dimitrov. I will explain some background and sketch Dimitrov's argument.

**February 25**

**Speaker:** Mahdi Asgari (Cornell University and OSU)

**Title:** Symmetric Algebras and L-functions

**Abstract:** I will explain the role that decompositions of certain symmetric algebras play in linking the local and global Langlands L-functions through a process called "unramified computation" and present some results along these lines, both old and new.

**March 3**

**Speaker:** Bin Guan (CUNY)

**Title:** Averages of central values of triple product L-functions

**Abstract:** Feigon and Whitehouse studied central values of triple L-functions averaged over newforms of weight 2 and prime level. They proved some exact formulas applying the results of Gross and Kudla which link central values of triple L-functions to classical “periods”. In this talk, I will show more results of this problem for more cases using Jacquet's relative trace formula, and some application of these average formulas to the non-vanishing problem.

#### ▪ March 10

**Speaker:** Jaiung Jun (SUNY New Paltz)

**Title:** Lattices, spectral spaces, and closure operations on idempotent semirings

**Abstract:** Spectral spaces, introduced by Hochster, are topological spaces homeomorphic to the prime spectra of commutative rings. In this talk, we introduce an analogous statement for idempotent semirings - a topological space is spectral if and only if it is the saturated prime spectrum of an idempotent semiring. We then introduce more examples of spectral spaces arising from idempotent semirings.

#### ▪ March 17 CANCELLED/POSTPONED

**Speaker:** Biao Wang (SUNY Buffalo)

**Title:** Some arithmetic functions and Chebotarev densities

**Abstract:** For  $M \setminus \{o\}$  bius function  $\mu$ , it is well-known that the prime number theorem is equivalent to  $\sum_{n=1}^{\infty} \frac{\mu(n)}{n} = 0$ . In 1977, Alladi showed a formula on the restricted sum of  $\frac{\mu(n)}{n}$  over the conjugacy class of smallest prime divisor of  $n$ . In 2017, Dawsey generalized Alladi's result to the setting of Chebotarev densities for finite Galois extensions of  $\mathbb{Q}$ . In this talk, we will introduce the analogues of their formulas with respect to the Liouville function and the Ramanujan sum, and propose a conjecture for more general arithmetic functions.

#### ▪ March 24 CANCELLED/POSTPONED

**Speaker:** Bogdan Ion (University of Pittsburgh)

**Title:** Bernoulli polynomials and Dirichlet series

**Abstract:** For a given sequence one can associate a power series and a Dirichlet series. We investigate the relationship between possible singularities that appear when we analytically continue both of these series. The most basic case, when the power series has a pole singularity at  $z=1$  is analyzed in detail by employing some (infinite order) discrete derivative operator (associated to the power series) that we call Bernoulli operator. Its main property is that it naturally acts on the vector space of analytic functions in the plane (with possible isolated singularities) that fall in the image of the Laplace-Mellin transform (for the variable in some half-plane). The action of the Bernoulli operator on the function  $t^s$ , provides the analytic continuation of the associated Dirichlet series and also detailed information about the location of poles, their residues, and special values. Using examples of arithmetic origin, I will attempt to illustrate what is reasonable to expect when the power series has a non-pole singularity at  $z=1$ .

#### ▪ March 31 CANCELLED/POSTPONED

**Speaker:** Andrew Lamoureux (Binghamton University)

**Title:** TBA

**Abstract:** TBA

#### ▪ April 14 CANCELLED/POSTPONED

**Speaker:** Vaidehee Thatte (Binghamton University)

**Title:** TBA

**Abstract:** TBA

**▪ April 21 CANCELLED/POSTPONED****Speaker:** Sayak Sengupta (Binghamton University)**Title:** TBA**Abstract:** TBA**▪ April 28 CANCELLED/POSTPONED****Speaker:** Patrick McGinty (Binghamton University)**Title:** TBA**Abstract:** TBA**▪ May 5 CANCELLED/POSTPONED****Speaker:** Helene Esnault (IAS and FU Berlin)**Title:** TBA**Abstract:** TBA

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