ARITHMETICA IZMIR 3

Date: November 8, 2019

Place: Dokuz Eylül University, Mathematics Department

Room: B256

Program

Time	Talk/Break
10:00–10:30	Welcome Coffee Break
10:30–11:45	Talk: Faruk Temur
11:45–13:30	Lunch Break
13:30–14:45	Talk: Ahmet Muhtar Güloğlu
14:45–15:15	Coffee Break
15:15–16:30	Talk: Emrah Sercan Yılmaz

Arithmetic approach to discrete fractional integrals

Faruk Temur
Izmir Institute of Technology, Turkey

Abstract

Discrete fractional integral operators with nonlinear phase polynomials are intimately connected with number theory. They connect to exponential sums amenable to Hardy-Littlewood circle method via the Fourier transform, and to representation of integers by quadratic or higher order forms via appropriate decompositions. While the first connection have been the main method for their study, in our recent work with E. Sert, using the second connection we obtained sharp results for a wide class of operators. In this talk we will give a summary of the history of these operators, exhibit the rich web of relations they have to number theory, and explain our recent work.

Distribution of zeros of L-functions

Ahmet Muhtar Güloğlu
I. D. Bilkent Unversity, Turkey

Abstract

I would like to talk about Katz and Sarnak's Density Conjecture and then give an example of a family of L-functions which support this conjecture, thereby describe the methods used in these problems.

Tools for Finding the Number of Zeros of Quadratic Trace Forms

Emrah Sercan Yılmaz
Boğaziçi University, Turkey

Abstract

Let q be a prime power and n be a positive integer. We call the functions from $\mathbb{F}_{q^n}$ to $\mathbb{F}_q$ with

$$x \mapsto Tr_{\mathbb{F}_{q^n}/\mathbb{F}_q}\left(\sum_{i=0}^{h} a_i x^{q^i+1}\right)$$

a quadratic trace form over $\mathbb{F}_q$ where h is a nonnegative integer and a_i's are in $\mathbb{F}_q$.

This forms are related with Artin-Schreier curves and they are supersingular. We gave a general tool for supersingular curves to find their number of rational points over all extensions with less information. We reduce this algorithm for the curves related with quadratic trace forms. We use this method to find the number of rational points of some families of the form $y^q - y = x^{q^b+1} - x^{q^a+1}$ over $\mathbb{F}_q$ where a and b are different positive integers.