First Congress of Greek Mathematicians
Special Session in Number Theory, Arithmetic Geometry, Cryptography
June 25, 2018

Organizers

Aristides Kontogeorgis – Dimitrios Poulakis – Pavlos Tzermias

Time Schedule of Talks

	Monday, June 25
17:00 – 17:20	Angelakis
17:20 – 17:40	Karagiannis
17:40 – 17:50	*break*
17:50 – 18:10	Kotsireas
18:10 – 18:30	Koutsianas

Speakers

Athanasios Angelakis (National Technical University of Athens)
Adelic point groups of elliptic curves

We show that for an elliptic curve E defined over a number field K, the group $E(A_K)$ of points of E over the adele ring A_K of K is a topological group that can be analyzed in terms of the Galois representation associated to the torsion points of E. An explicit description of $E(A_K)$ is given, and it is shown that the adelic point group of "almost all" elliptic curves over a number field K of degree n is a topological group isomorphic to

$$(\mathbb{R}/\mathbb{Z})^n \times \widehat{\mathbb{Z}}^n \times \prod_{m=1}^{\infty} \mathbb{Z}/m\mathbb{Z}.$$

We also show that there exist infinitely many elliptic curves over K that have a different adelic point group.

Joint work with Peter Stevenhagen.

Kostas Karagiannis (Aristotle University of Thessaloniki)
On The Canonical Embedding of the Kummer-Artin Schreier-Witt family of curves

In joint work with professors Hara Charalambous and Aristides Kontogeorgis we study a flat family of curves, which unifies Kummer and Artin-Schreier-Witt theories. It first appeared as a partial solution to Oort's more general lifting problem in work by Oort-Sekiguchi-Suwa in 1989 and Bertin-Mézard in 2000. The family's sheaf of holomorphic differentials was studied by Karanikolopoulos-Kontogeorgis in 2014 who, among other results, described the Galois module structure of its global sections. Using these results and a classical theorem of Max Noether, Enriques and Petri, we define the family's canonical embedding into projective space and provide explicit generators for its kernel, aiming to obtain the Galois module structure of the global sections of the sheaf of $2-$differentials.

Ilias Kotsireas (Wilfrid Laurier University, Waterloo)
An accessible introduction to Elliptic Curves

We will present an accessible introduction to the vast theory of Elliptic Curves, from an elementary standpoint, i.e. by looking for points with integer/rational coordinates in polynomial equations. Among other things, we will explain the concept of the rank of an

elliptic curve, the group law for elliptic curves, Noam Elkies' record rank elliptic curve and the Birch and Swinnerton-Dyer conjecture. No previous knowledge of Elliptic Curves is necessary, this is designed to be a self-contained talk.

Angelos Koutsianas

Sums of squares in a three term arithmetic progression

We will study the primitive solutions of the equation $(x-d)^2 + x^2 + (x+d)^2 = y^n$ when d is a prime power. Our method is based on the characterization of primitive divisors of Lucas-Lehmer sequences.