**CALENDAR**

**Wednesday, February 11**
- **Seminar in Free Probability and Random Matrices**
  - **Time:** 4:30 p.m.
  - **Place:** Jeffery 422
  - **Speaker:** Maryam Hosseini, University of Ottawa
  - **Title:** Continuous Spectrum, Orbit Equivalence and Dimension Groups
  - **Abstract Attached**

**Thursday, February 11**
- **CYMS Seminar**
  - **Time:** 12:30 p.m.
  - **Place:** Jeffery 422
  - **Speaker:** Alexander Molnar, Queen’s University
  - **Title:** Arithmetic and intermediate Jacobians of some rigid Calabi-Yau threefolds
  - **Speaker:** Noriko Yui, Queen’s University
  - **Title:** Arithmetic of Calabi-Yau varieties over Q of dimension ≤ 3

**Thursday, February 12**
- **Math Club**
  - **Time:** 5:30 p.m.
  - **Place:** Jeffery 118
  - **Speaker:** Jamie Mingo, Queen’s University
  - **Title:** What is and what should be a number

**Friday, February 13**
- **Number Theory Seminar**
  - **Time:** 9:30 a.m.
  - **Place:** Jeffery 422
  - **Speaker:** Siddhi Pathak, Queen’s University
  - **Title:** Generalization of a problem of Chowla

**Friday, February 13**
- **Department Colloquium**
  - **Time:** 2:30 p.m.
  - **Place:** Jeffery 234
  - **Speaker:** Ram Murty, Queen’s University
  - **Title:** Twin Primes

**Monday, February 16**
- **Family Day**
  - **Abstract Attached**

University offices are closed.

Items for the Info Sheet should reach Anne (burnsa@mast.queensu.ca) by noon on Monday. The Info Sheet is published every Tuesday.

**Wednesday, February 11, 4:30 p.m. Jeffery 422**

**Seminar in Free Probability and Random Matrices**

**Speaker:** Maryam Hosseini
**Title:** Continuous Spectrum, Orbit Equivalence and Dimension Groups

**Abstract:** We investigate the existence of a continuous eigenvalue for a Cantor minimal system, \((X, T)\), with regards to its dimension group, \(K_0(X, T)\). In this context, the notion of irrational mixability for dimension groups is introduced and some (necessary and) sufficient conditions for this property will be given. The main property of these dimension groups is the absence of irrational values in the set of continuous spectrum of their realizations by Cantor minimal systems.

Any realization of an irrationally mixable dimension group with cyclic rational subgroup is weakly mixing and cannot be (strong) orbit equivalent to a Cantor minimal system with non-trivial spectrum. The talk is based on a recent joint work with Theirry Giordano and David Handelman.
Thursday, February 11, 12:30 p.m. Jeffery 422
Speaker: Alexander Molnar
Title: Arithmetic and intermediate Jacobians of some rigid Calabi-Yau threefolds

Abstract: Generalizing the Jacobian variety of a curve, one may associate to any higher dimensional complex variety X, some complex varieties defined in terms of cohomological quotients of X, the intermediate Jacobians of X. These receive cycle class maps, so there is much interest in being able to study them over number fields, in order to study the many open conjectures on cycles and Chow groups of varieties.

We will discuss some examples of rigid Calabi-Yau threefolds where we compute the intermediate Jacobians as complex tori, and show that each choice of rational model of the threefolds leads to a natural rational model of the intermediate Jacobians. This allows us to consider (quadratic) twists of the threefolds, see how this affects the 'twisted' intermediate Jacobians, and compute the respective L-functions looking for relationships between them.

Speaker: Noriko Yui
Title: Arithmetic of Calabi-Yau varieties over Q of dimension ≤ 3

Abstract: Let X be a Calabi-Yau variety defined over Q of dimension d. We will focus on the cases where d ≤ 3. Our goal is to establish the arithmetic modularity/automorphy of X. We will discuss two situations where our goal may be achieved:

(1) when X is equipped with large automorphism group, and the d-th cohomological Galois representation of X into smaller pieces, and

(2) when X is of CM type, or the intersection of (1) and (2).

We present some examples.

Thursday, February 11, 5:30 p.m. Jeffery 118
Speaker: Jamie Mingo
Title: What is and what should be a number

Abstract: Do numbers already exist or do we have to construct them? Is mathematics invented or discovered? I won't try to answer this question, however I will look at how numbers have been constructed over time. I will start by looking at how the Babylonians dealt with the square root of 2. I will then turn to recent constructions by von Neumann, Dedekind, and Conway. Conway's construction can be used to analyse games.

Friday, February 13, 9:30 p.m. Jeffery 422
Speaker: Siddhi Pathak
Title: Generalization of a problem of Chowla

Abstract: In 1969, S. Chowla raised a question about the non-vanishing of the L-series attached to a rational-valued periodic function at 1. We will discuss a generalization of this question, which is joint work with Prof. Murty.
Abstract: The twin prime problem is the assertion that there are infinitely many distinct primes $p,q$ with $|p-q|=2$. This is still an open problem. In May 2013, Yitang Zhang surprised the world by proving that there are infinitely many pairs of distinct primes $p,q$ such that $|p-q| < 70$ million. Until Zhang's work, no bound was known. After Zhang's paper, this bound has been improved and in November 2013, Maynard and Tao gave a simplified proof of Zhang's theorem with better numerical results. The bound now is 246. We will survey these developments as well as report on some recent joint work with Akshaa Vatwani related to this topic.