Additive combinatorics II
(Org: **Hamed Hatami** (McGill University))

PABLO CANDELA, Autonomous University of Madrid
A generalization of the inverse theorem for uniformity norms

The uniformity norms, introduced by Gowers, are very useful tools in additive combinatorics. A central result regarding these norms is the inverse theorem, proved for functions on finite cyclic groups by Green, Tao and Ziegler, which states essentially that such a function has large uniformity norm of order k+1 only if the function correlates with a nilsequence of step k. I shall discuss recent joint work with Balázs Szegedy in which we obtain a generalization of the Green-Tao-Ziegler inverse theorem, extending it to a class of objects including all compact abelian groups and also more general objects such as nilmanifolds.

ESHAN CHATTOPADHYAY, Cornell University
Non-Malleable Extractors and Codes from Additive Combinatorics

Extractors are algorithms that produce purely random bits from defective sources. Non-malleable extractors generalize extractors in a strong way, and produce random bits even in the presence of adversaries. I will talk about an explicit construction of non-malleable extractors using a sum-product theorem over rings. If time permits, I will discuss applications to non-malleable codes which are an elegant generalization of error-correcting codes.

This is based on joint work with David Zuckerman.

OLEKSIY KLURMAN, Royal Institute of Technology (KTH)
The Erdos discrepancy problem over the function fields

The famous Erdos discrepancy problem (now theorem of Tao) asserts that for any sequence $\{a_n\}_{n\geq 1} = \{\pm 1\}^{\mathbb{N}}$,

$$\sup_{n,d}\left|\sum_{k=1}^{n} a_{kd}\right| = \infty.$$

It was observed during the Polymath5 project, that the analog of this statement over the polynomial ring $\mathbb{F}_q[x]$ is false. In this talk, we discuss "corrected" form of EDP over $\mathbb{F}_q[x]$ explaining some features that are not present in the number field setting. The talk is based on a joint work with A. Mangerel (CRM) and J. Teravainen (Oxford).

JOZSEF SOLYMOSI, University of British Columbia
The Uniformity Conjecture and the Sum-product Phenomenon

The sum-product phenomenon states that, for most of the $F(x,y)$ polynomials no matter how do we select two sets of numbers A and B, where $|A| = |B| = n$, the range of $F(A,B)$ will be much larger than n. We will see that assuming a major conjecture in arithmetic geometry, the Uniformity Conjecture of Bombieri and Lang, one can improve some of the classical results in this area.