RYERSON UNIVERSITY
DEPARTMENT OF MATHEMATICS
GRAPHS AT RYERSON (G@R) SEMINAR

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Date: Thursday, February 28, 2019
Time: 10am
Location: ENG 210

Tusnady's Problem and the Discrepancy of Boxes and Polytopes

Abstract:

Tusnady's problem is a classical question in combinatorial discrepancy theory, which asks for the smallest number Δ for which any set P of n points in d-dimensional space can be colored with -1 and $+1$ so that the sum of colors in any axis-aligned box is at most Δ in absolute value. We show that Delta can be bounded from above by $O((\log n)^{d-0.5})$, which is an $O((\log n)^{0.5})$ factor away from the known lower bound. We also extend this upper bound, as well as the lower bounds, to the case when the axis-aligned boxes are replaced with arbitrary translations and scalings of a fixed polytope. These combinatorial results have several applications in numerical analysis and computer science. In particular, the upper bound for Tusnady's problem implies the existence of well-distributed pointsets in d-dimensional space with respect to arbitrary Borel probability measures, which are useful in the quasi Monte-Carlo method for estimating integrals.

Part of the talk is based on joint work with Christoph Aistleitner and Dmitriy Bilyk.

All faculty, staff, students and guests are welcome to attend