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INFORMAL ANALYSIS SEMINAR
Saturday and Sunday, April 20-21, 2019

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LECTURES: Mathematical Sciences Building, Room 228., Second floor.
POSTER SESSION/REFRESHMENTS/LUNCHES: SCALE-UP Mathematics Lab, room 319 Mathematical Sciences Bldg., Third floor.

The Mathematical Sciences Building is located on 1300 Lefton Esplanade, Kent, OH 44242. To search it on Google Maps, please, use Mathematics and Computer Science Building, Kent, OH 44243.

Saturday, April 20

11:00 - 11:30	Coffee in Room 319 MSB
11:30 - 12:30	Eugenia Malinnikova
12:30 - 1:30	Lunch in Room 319 MSB
1:30 - 2:30	Ramon van Handel
2:30 - 3:30	Break/Poster Session
3:30 - 4:30	Eugenia Malinnikova
4:30 - 5:00	Break
5:00 - 6:00	Ramon van Handel
6:30pm	Dinner: Wild Papaya Thai Cuisine (1665 E Main, Kent, OH 44240).

Sunday, April 21

09:00 - 10:00	Eugenia Malinnikova
10:00 - 10:15	Break
10:15 - 11:15	Ramon van Handel
11:15 - 11:30	Break
11:30 - 12:30	Ramon van Handel
12:30 - 1:30	Lunch in Room 319 MSB

Convex surfaces, quantum graphs, and a problem of H. Minkowski.

Ramon van Handel

Abstract: Much of the foundation for the theory of convex geometry was put forward by H. Minkowski around the turn of the 20th century. In a seminal 1903 paper, Minkowski introduces the fundamental notion of mixed volumes and the corresponding inequalities that play a central role in the modern theory, and that turn out to have unexpected connections to various other areas of mathematics. The extremals of these inequalities (and those of their ultimate generalization due to Alexandrov-Fenchel) are unknown: the problem of characterizing them dates back to Minkowski's original paper.

In joint work with Yair Shenfeld, we recently succeeded in fully settling this problem in the original setting of Minkowski's quadratic inequality (which contains, for example, the Alexandrov-Fenchel inequality in three dimensions), confirming a conjecture of R. Schneider. Along the way we encounter various unusual geometric and analytic objects. My aim in these lectures will be to introduce these dramatis personae, and to sketch how they fit together to yield the characterization of the extremals.

Uniqueness theorems for discrete harmonic functions.

Eugenia Malinnikova

Abstract: The classical Liouville theorem says that a bounded harmonic function is a constant, the result holds in both continuous and discrete settings. At the same time the analogy stops here, more delicate uniqueness properties for discrete and continuous harmonic functions are surprisingly different. For example, a non-zero harmonic function on the Euclidean plane cannot be zero on an open subset of the plane, however there are many discrete harmonic functions on $\mathbb{Z}^2$ that vanish on the half plane $\{x > y\}$. The main result that we prove in the lectures is a following improvement of the Liouville theorem: if u is a discrete harmonic function on a lattice $\mathbb{Z}^2$, and $|u| < 1$ on $99,999\%$ of $\mathbb{Z}^2$, then u is constant. The corresponding statement for continuous harmonic functions is false. The lectures are based on the work arXiv:1712.07902 by Lev Buhovsky, Alexander Logunov, Eugenia Malinnikova, and Mikhail Sodin.