The Mathematics Research Center Distinguished Lecturer Series

presents

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"Lectures on Abundance Phenomena in Real Enumerative Geometry"
(based on a series of joint works with I. Itenberg, E. Shustin, with S. Finashin, and with R. Rasdeaconu).

Surprisingly, in quite a number of real enumerative problems, the number of real solutions happens to satisfy high lower bounds. For the moment, such a phenomenon is rather deep studied in the following cases: in counting real lines and higher dimensional linear subspaces on projective hypersurfaces and complete intersections (a typical problem from a kind of Real Schubert Calculus); and in counting real rational curves interpolating real points on rational and K3 surfaces (a typical problem from a kind of Real Gromov-Witten Calculus). In all these cases, the number of real solutions taken in the logarithmic scale happens to be asymptotically equivalent to the number of complex ones or, if not, to be proportional, often with coefficient one-half, to the number of complex solutions. One of the key points in disclosing of such an abundance is a suitable sign count that makes the algebraic number of real solutions independent on input data (Welschinger invariants is one of the most prominent examples), which opens a way for searching how to calculate the invariants thus obtained and/or deduce strong lower bounds.

Lecture 1: **Thursday, May 21–4:15pm in 380-W**

In the first lecture, I intend to present the general picture, including elementary definitions of the signs involved and the main statements, and to illustrate the approaches developed so far by a few basic examples.

(Reception at 3:00pm, before the talk, in the new 4th floor lounge!)

Lecture 2: **Friday, May 22–3:45pm in 383-N**

Lecture 3: **Tuesday, May 26–2:30pm in 384-H**

The second and the third lectures will be devoted to discussing, more in detail, the solutions of the above counting problems (counting of real linear subspaces on hypersurfaces in the second lecture, and counting of real rational curves on K3 surfaces in the third one): how one can make the invariants as explicit as possible, both in real and complex settings, and how to perform an asymptotic comparison between the real and the complex answers. Open questions—and conjectures—will be presented as well.