THE FIELDS INSTITUTE FOR RESEARCH IN MATHEMATICAL SCIENCES

Thematic Program on Calabi-Yau Varieties:
Arithmetic, Geometry and Physics

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Distinguished Lecture Series
October 15–17, 2013
AT THE FIELDS INSTITUTE

What is Tropical Mathematics?
October 15, 2013 • 3:30 p.m.

In tropical mathematics the usual laws of algebra are changed, the subtraction is forbidden, the division is always permitted, and 1+1 is equal to 1. Analogs of usual geometric shapes like lines, circles etc. are replaced by new figures composed of pieces of lines. I will try to explain basics of tropical algebra and geometry, its relation with more traditional domains, and its role in mirror symmetry which is a remarkable duality originally discovered in string theory about 20 years ago.

Quivers, Cluster Varieties, and Integrable Systems
October 16, 2013 • 3:30 p.m.

I'll describe a new approach to cluster varieties and mutations based on scattering diagrams and wall-crossing formalism. The central role here is played by certain canonical transformation (formal change of coordinates) associated with arbitrary quiver. Also, a complex algebraic integrable system under some mild conditions produces a quiver, and the associated canonical transformation is a birational map.

Fukaya Category Meets Bridgeland Stability
October 17, 2013 • 3:30 p.m.

Bridgeland's notion of stability in triangulated categories is believed to be a mathematical encoding of D-branes in string theory. I'll argue (using physics picture) that partially degenerating categories with stability should be described as a mixture between symplectic geometry and pure algebra. Spectral networks of Gaiotto, Moore and Neitzke appear as an example.

For more information: www.fields.utoronto.ca

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