(CRM-, Joint-) Colloquium

Fridays 3:30pm, Room B005,
Department of Mathematics and Statistics,
University of Ottawa

Supported by

Coffee: Common Room, before the colloquium at 3pm.

(Carleton-uOttawa shuttle information)

Schedule:

Jan. 20 (CRM-colloquium)

- Dmitry Jakobson (McGill)
- Curvature of random metrics
- We study Gauss curvature for random Riemannian metrics on a compact surface, lying in a fixed conformal class; our questions are motivated by comparison geometry. Next, analogous questions are considered for the scalar curvature in dimension n>2, and for the Q-curvature of random Riemannian metrics. This is joint work with I. Wigman and Y.Canzani.

Jan. 27 (Joint Colloquium at Carleton University)

- Daniel Wise (McGill)
- Cube Complexes
- CAT(0) cube complexes are high-dimensional generalizations of trees that have emerged as increasingly central objects in infinite group theory. I will indicate their most prominent geometric properties and describe some of their appearances within mathematics and then explain how these cube complexes arise from infinite groups.

Feb. 10 (CRM Distinguished Lecture)

- François Ledrappier (University of Notre Dame, USA)
- Entropy rigidity for non-positive compact manifolds
- We consider different asymptotic rates related to the geometry of the universal cover of a compact manifold. We discuss relations between these rates, a characterization of symmetric spaces of non-positive curvature and related problems.
- François Maurice Ledrappier is The John and Margaret McAndrews Professor of Mathematics at the University of Notre Dame. François Ledrappier has published in some of his field's most reputed journals including The Annals of Mathematics. As a teacher and scholar, he focuses primarily on the asymptotic properties of group actions and the relationships between objects associated with them. Ledrappier, whose academic reputation spans the Atlantic, is a recipient of the Prix Carrière, presented by the French Academy of Sciences for a high level of distinction over one's career, and has delivered an invited address to the International Congress of Mathematics. Before coming to Notre Dame, he was a faculty member at the École Polytechnique; from 1995 to 2000, he served as president of the Mathematics Section of the Comité National de la Recherche Scientifique (CNRS).

Mar. 2 (CRM-colloquium)

- Richard Cook (Waterloo)
- Title: Analysis of longitudinal data with selection effects due to dependent observation schemes
- Abstract: There has been considerable attention given in recent years to the statistical issues related to incomplete longitudinal data due to drop-out. It is well known that when data are missing completely at random likelihood and estimating function approaches yield consistent estimators but approaches based on estimating functions yield inconsistent estimators when data are missing at random. In some settings, however, the amount of data available is dictated not by drop-outs but by a stochastic mechanism related to the response process. We consider such a problem in the context of platelet transfusion trials where the aim is to assess the effectiveness of different platelet transfusion products and responses are obtained at each transfusion. In this setting different patients will require a different number of transfusions and the need for a transfusion at any given time is influenced by the responses to previous transfusions. An inverse probability weighted estimating function approach is explored in this setting to fit a marginal structural model. Simulation studies illustrate how the method performs empirically, and an application to a recent platelet transfusion trial will be given for illustration.
- Biography: Professor Cook obtained his BSc in statistics from McMaster University before coming to the University of Waterloo for a Masters in mathematics (statistics) in 1988. He obtained his PhD in statistics in 1992 and has held various positions in the Department of Statistics and Actuarial Science where he is now professor and Canada Research Chair in Statistical Methods for Health Research. He currently holds a cross-appointment with the Department of Health Studies and Gerontology at the University of Waterloo, and a part-time appointment in the Department of Clinical Epidemiology and Biostatistics at McMaster University. Professor Cook engages in active collaborations with oncologists from McMaster University, Harvard University, the University of Pennsylvania, and Sheffield University (UK) on problems relating to the analysis of treatments for the prevention of complications arising from metastases in cancer patients. He also collaborates with faculty in the McMaster Transfusion Research Program and has co-authored several methodological and clinical papers in transfusion medicine. Professor Cook works closely with rheumatologists at the Centre for Prognosis Studies in Rheumatic Disease at the University of Toronto, where contributions have been made for the characterization of rates and risk factors for disease progression in arthritis. Professor Cook is a member of the National Cancer Institute of Canada's Disease Site Group, serves on several advisory boards for pharmaceutical companies, and has been a consultant with industry for several years. Professor Cook has held career awards from the Medical Research Council of Canada (1995-99) and the Canadian Institutes of Health Research (2000-05), and is currently funded by NSERC, CIHR, CRC, and industry.

Mar. 16 (Colloquium)

- Shabnam Ahktari (CRM)
- Representation of integers by binary forms.
- Let F (x, y) be an irreducible binary form with integral coefficients and degree n greater than 2. By a well-known result of Thue, the equation F(x,y) = m (m an integer) has finitely many solutions in integers x and y. I shall discuss some methods from Diophantine analysis and geometry of numbers to obtain upper bounds upon the number of integral solutions to such equations. Then I will show some results on representation of integers by binary forms with a specific emphasis on the important case of cubic equations.

Mar. 23 (CRM Colloquium)

- Steven Lu (UQAM)
- The Picard Theorem for complex analytic functions and a structure theory for compact complex manifold.
- The Little Picard Theorem says that a complex analytic function defined on the entire complex plane C, called an entire function, can miss at most one complex value. Its standard proof reduces problem to the fact that C minus two point is hyperbolic (in the sense of negative curvature as is the case of the unit disk). The higher dimensional generalization of hyperbolicity, at least in the birational context, is that of general type (almost everywhere negative curvature). We will define the opposite notion to that of general type, that of being special, and discuss our result that any object defined by complex polynomials (a variety) X has a decomposition as a fiber space over a base object of general type whose fibers are special. A conjectural generalization of the Little Picard theorem would then be that there exist an entire function with values in X not contained in any subvariety in X if and only if X is special. We will conclude by our verification of the conjecture for X that is of maximal albanese dimension, which is the case for C minus two points.

Mar. 30 (Joint Colloquium at Carleton)

- Miklos Csorgo, Carleton University
- Two-dimensional anisotropic random walks: fixed /versus/ random column configurations for transport phenomena.
- Along the lines of Heyde (1982, 1993) and den Hollander (1994), we consider random walks on the square lattice of the plane whose studies have in part been motivated by the so-called transport phenomena of statistical physics (cf., e.g., *1 Introduction *of [4] and *1.4 History* of [2], and their references). Two-dimensional anisotropic random walks with asymptotic density conditions /a' la/ [3] and [4] yield fixed column configurations, and nearest-neighbour random walks in a random environment on the square lattice of the plane as in [2] result in random column configurations. In both cases we will conclude simultaneous weak Donsker and strong Strassen type invariance principles in terms of appropriately constructed anisotropic Brownian motions on the plane. The style of presentation will be that of a semi-expository survey of related results in a historical context.
  References
  *[1] Csaki, E., Csorgo, M., Foldes, A. and Revesz, P. (2011). Strong limit theorems for anisotropic random walks on *Z**^2. /Tech. Rep. Ser. LRSP, /No. 454 - April 2011, Carleton U. - U. of Ottawa.
  [2] den Hollander, F. (1994). On three conjectures by K. Sluiter. /J. Statist. Physics/ *75* 891-918.
  [3] Heyde, C.C. (1982). On the asymptotic behaviour of random walks on an anisotropic lattice. /J. Statist. Physics/ *27* 721-730.
  [4] Heyde, C.C. (1993). Asymptotics for two-dimensional anisotropic random walks. In: /Stochastic Processes./ Springer, New York, pp. 125-130.
  *Joint work with Endre Csaki, Antonia Foldes and Pal Revesz.

Apr. 13 (CRM-distinguished lecture)

- Jean Bellissard (Georgia Institute of Technology, School of Mathematics and School of Physics)
- The Transverse Geometry of Tiling Spaces
- Tilings or Delone sets in $\mathbb{R}^n$ can be described through the concept of Hull and of Tiling Space. The former is the set of all tilings sharing with a given tiling the same family of local patches, modulo translation or modulo Euclidean isometries. The Hull is a foliated space while the Tiling Space is its canonical transversal. For tilings that are aperiodic, repetitive with finite local complexity, the Tiling Space is a Cantor set that can be constructed from a rooted tree associated with the local patch structure. All ultrametrics on the Tiling Space are built from a Michon's weight. Example will be given. Such a weighted rooted tree will give rise to a family of Spectral Triples, from which the Geometry of the Tiling Space can be reconstructed. This spectral triple gives complementary informations, like the Hausdorff dimension of the Tiling Space, or its Hausdorff measure. In addition it leads to the definition of the analog of a Laplace-Beltrami Operator, called the Pearson Laplacian. The main known properties of this operator will be given. Extension to non finite local complexity will be discussed in the conclusion.

April 17 (Special Colloquium at UOttawa) at 13:00 - Room B004

- Michel Pierre (ENS Cachan)
- An amazing L^2 estimate in reaction-diffusion systems: four applications
- Abstract: PDF file

April 20 (Joint Colloquium at Carleton)

- Boris Levit (Queen's)
- On optimal approximation and interpolation of random data
- Abstract: PDF file

May 4 (Joint Colloquium) Different Building - FTX, Room 133

- J. Zabczyk (Institute of Mathematics, Polish Academy of Sciences, Warsaw, Poland)
- Partial differential equations with Levy noise
- The talk is devoted to equations with partial derivatives perturbed by processes with independent increments called also Levy processes. Classical existence and uniqueness results are extended from the case of Gaussian perturbations to the Levy ones. Special attention is paid to spatial and temporal regularity of the solutions. Some recent results on large time asymptotic of the solutions are discussed as well.