

Department of Mathematical Sciences welcomes

John Harnad

Centre de Recherches Mathématiques, Concordia University & Princeton Institute for Advanced Study



Generating weighted Hurwitz numbers using τ -functions for integrable hierarchies

October 11, 2019

Hosted by:
Prof. Alexander Its

Tea begins at 3:00
in LD 259

Research Topic
begins at 3:30
in LD 229

ABSTRACT: Hurwitz numbers enumerate branched coverings of the Riemann sphere with specified ramification profiles at the branch points. Weighted Hurwitz numbers are sums over these, weighted by symmetric functions of a (possibly infinite) set of auxiliary weighting parameters, or equivalently, polynomials in the formal Taylor series of a *weight generating function* $G(z)$. Examples include: rationally and quantum weighted Hurwitz numbers. The weight generating function may also be used to define τ -functions of hypergeometric type for integrable hierarchies of KP or 2D Toda type that serve as combinatorial generating functions for the weighted Hurwitz numbers. More effective generating series are provided by multicurrent correlators $W_g(x_1, \dots, x_l)$, which group weighted (single) Hurwitz numbers according to the number l of ramification points over a single, unweighted branch point. These generate explicit expressions for the weighted Hurwitz numbers, as graded homogeneous polynomials in the Taylor coefficients of $G(z)$, which are computable in polynomial time.

ABOUT THE SPEAKER: Professor Harnad is one of the top mathematical physicists whose area of expertise includes quantum field theory, integrable systems, and random matrices. He has made several major contributions to the development of each of these three domains.

Professor Harnad did his undergraduate studies at McGill University and his doctorate at the University of Oxford (D.Phil. 1972) under the supervision of John C. Taylor. He is currently Director of the Mathematical Physics group at the Centre de recherches mathématiques (CRM), a national research centre in mathematics at the Université de Montréal and Professor in the Department of Mathematics and Statistics at Concordia University. He is an affiliate member of the Perimeter Institute for Theoretical Physics and was a long-time visiting member of the Princeton Institute for Advanced Studies

