

Department of Mathematical Sciences welcomes

## Martin Guest Waseda University, Tokyo



March 6, 2020

Hosted by:  
Prof. Alexander Its

Tea begins at 3:00  
in LD 259

Research Topic  
begins at 3:30  
in LD 229

### **Polytopes, supersymmetry, and integrable systems**

#### **ABSTRACT:**

The Coxeter Plane is a diagram obtained by projecting the roots of a Lie algebra (or the polytope spanned by the roots) onto a 2-dimensional subspace. It achieved fame around 2010 because the case of  $E_8$  gave a theoretical model for an experiment involving a 1-dimensional magnet. (D. Borthwick and S. Garibaldi, Did a 1-dimensional magnet detect a 248-dimensional Lie algebra?, Notices of Amer. Math. Soc. 2011 and B. Kostant, Experimental evidence for the occurrence of  $E_8$  in nature and the radii of the Gosset circles, Selecta Math. 2010.) The underlying physics concerns perturbations of conformal field theories with remarkable properties; the underlying mathematics concerns integrable systems of nonlinear partial differential equations with equally remarkable properties. Recent progress with the latter has made possible a more precise description (and verification) of some of the physical predictions.

#### **ABOUT THE SPEAKER:**

Martin Guest received his PhD at Oxford University in 1981, working as a topologist under the direction of Graeme Segal. Gradually his research evolved in the direction of differential geometry, integrable systems, and quantum cohomology, topics on which he published introductory books in 1997 and 2008 and is now one of the top world authorities. In recent years he has collaborated with Alexander Its, Chang-Shou Lin, and Nan-Kuo Ho on the  $tt^*$  equations, a system of nonlinear p.d.e. from physics which involves all of the above areas. Professor Guest has held permanent positions at the University of Rochester, Tokyo Metropolitan University, and (currently) Waseda University.

