**Submittee:** Jenna Rajchgot
**Date Submitted:** 2017-11-19 07:29
**Title:** Canadian Western Algebraic Geometry Symposium (CaWAGS)
**Event Type:** Conference-Workshop

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**Location:**
University of Alberta

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**Dates:**
October 21 and 22, 2017

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**Topic:**
Algebraic Geometry

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**Methodology:**
There were a total of seven lectures, each of which was 50 minutes long. There were also two poster presentations.

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**Objectives Achieved:**
This conference brought together graduate students, postdocs, and faculty members studying algebraic geometry. The majority of participants were from Western Canada, with a few from institutions in other parts of North America.

Participants learned about current research being conducted through lectures and poster presentations. Participants also made good use of breaks between lectures, and after lectures, to discuss the research presented as well as other mathematics.

It is our hope that CaWAGS will become a yearly event.

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**Organizers:**
Doran, Charles, Mathematical and Statistical Sciences, University of Alberta
Favero, David, Mathematical and Statistical Sciences, University of Alberta
Ilten, Nathan, Department of Mathematics, Simon Fraser University
Rajchgot, Jenna, Department of Mathematics and Statistics, University of Saskatchewan

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**Speakers:**
Speaker: Christine Berkesch Zamaere
School of Mathematics, University of Minnesota
Title: Parametric variation of hypergeometric systems
Abstract: We describe the parametric behavior of the series solutions of an A-hypergeometric

system. More precisely, we construct explicit stratifications of the parameter space such that, on each stratum, the series solutions of the system are holomorphic. In certain special cases, this leads to an explicit connection between hypergeometric functions at rank jumping parameters and elements in local cohomology modules of a semigroup ring.

Speaker: Maria Angelica Cueto
Department of Mathematics, The Ohio State University
Title: Anticanonical tropical del Pezzo surfaces contain exactly 27 lines
Abstract: Since the beginning of tropical geometry, a persistent challenge has been to emulate tropical versions of classical results in algebraic geometry. The well-know statement ``any smooth surface of degree 3 in P^3 contains exactly 27 lines'' is known to be false tropically. Work of Vigeland from 2007 provides examples of cubic surfaces with infinitely many lines and gives a classification of tropical lines on general smooth tropical surfaces in TP^3.
In this talk I will explain how to correct this pathology. The novel idea is to consider the embedding of a smooth cubic surface in P^44 via its anticanonical bundle. The tropicalization induced by this embedding contains exactly 27 lines under a mild genericity assumption. More precisely, smooth cubic surfaces in P^3 are del Pezzos, and can be obtained by blowing up P^2 at six points in general position. We identify these points with six parameters over a field with nontrivial valuation. Our genericity assumption involves the valuations of 36 linear expressions in these parameters which give the positive roots of type E_6. Tropical convexity plays a central role in ruling out the existence of extra tropical lines on the tropical cubic surface.

Speaker: Charles Doran
Mathematical and Statistical Sciences, University of Alberta and ICERM
Title: On the classification of K3 fibered Calabi-Yau threefolds
Abstract: Kodaira's celebrated classification of elliptic surfaces with section is the "toy model" for a theory of K3 surface fibered threefolds. We will see how each key feature in Kodaira's story admits an analogue, and use a mix of Hodge theory and geometry to completely classify Calabi-Yau threefolds fibered by certain high-Picard rank K3 surfaces. Time permitting, we will use both classifications to illustrate some key features of a new mirror symmetry conjecture.

Speaker: Steven Rayan
Department of Mathematics and Statistics, University of Saskatchewan
Title: Asymptotic geometry of hyperpolygons
Abstract: Nakajima quiver varieties lie at the interface of geometry, representation theory, and combinatorics. I will discuss a particular example, hyperpolygon space, which arises from star-shaped quivers. The simplest of these varieties is a noncompact complex surface admitting the structure of an "instanton", and therefore fits nicely into the Kronheimer-Nakajima classification of ALE hyperkaehler 4-manifolds, which is a geometric realization of the McKay correspondence for finite subgroups of SU(2). For more general hyperpolygon spaces, we speculate on how this classification might be extended by studying the asymptotic geometry of the variety. In moduli-theoretic terms, this involves driving the stability parameter for the quotient to an irregular value. This is joint work in progress with Harmut Weiss, building on previous work with Jonathan Fisher.

Speaker: Yongbin Ruan
Department of Mathematics, University of Michigan
Title: A genus two mirror theorem for Gromov-Witten theory of quintic 3-fold
Abstract: The computation of Gromov-Witten theory of compact Caleb-Yau 3-fold (symbolized by the quintic 3-fold) is a central problem in geometry and physics where the mirror symmetry plays a key role. Using the mirror symmetry, Candelas and his collaborators proposed a surprising conjectural formula in genus zero in early 90's. The effort to prove the formula in mathematics has leaded the birth of mirror symmetry as a mathematical subject. The genus zero mirror symmetry was

established by Givental and Liu-Lian-Yau in 96. As early as 93, Bershadsky, Cecotti,Ooguri and Vafa (BCOV) have already proposed a conjectural formula for genus one and two Gromov Witten invariants of the quintic 3-fold. It took ten years for Zinger to prove the genus one conjecture. Now another ten years have passed. In the talk, I will report a solution to genus two conjecture as well as an approach to go to much higher genus. This is a joint work with Shuai Guo and Felix Janda.

Speaker: Greg Smith
Department of Mathematics and Statistics, Queen's University
Title: Combinatorics of Toric Vector Bundles
Abstract: To each torus-equivariant vector bundle over a smooth complete toric variety, we associate a finite collection of line bundles indexed by vectors in a finite dimensional vector space. In this talk, we will describe how the combinatorics of this data encodes a resolution of the toric vector bundle. We will also indicate some applications of these resolutions.

Speaker: Mattia Talpo
Department of Mathematics, Simon Fraser University
Title: A logarithmic version of the derived McKay correspondence
Abstract: The derived McKay correspondence is an equivalence of derived categories between two different resolutions of certain singular varieties. The simplest example is given by the quotient of the complex 2-dimensional affine space by the action of a finite subgroup of SL(2,C), and the two resolutions in this case are given by the corresponding quotient stack, and by the minimal resolution obtained via blowups.
After recalling some background and history of the topic, I will talk about joint work with Sarah Scherotzke and Nicolo Sibilla, where we prove a "limit" version of this derived equivalence in the context of logarithmic geometry. The two sides of the equivalence in our case are given respectively by the "infinite root stack", corresponding to stacky resolutions, and by the "valuativization", corresponding to resolutions obtained via blowups.

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**Links:**

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