

Regulators and Heights in Algebraic Geometry

University of Alberta, Edmonton, **Kanada**

April 12 - 16, 2008

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Schedule: Talks will be held at CAB 269 (April 12, 14, 15, 16) and ETL E1 008 (April 13). We have booked the computer lab at CAB 341.

Time	Saturday April 12	Sunday April 13	Monday April 14	Tuesday April 15	Wednesday April 16
9:30 - 10:30		Kumar Murty	Sampei Usui	Elisenda Feliu	Marie-José Bertin
10:30 - 11:00		☕	☕	☕	☕
11:00 - 12:00	☺☺☺	Matt Kerr	Xiaowei Wang	José Ignacio Burgos Gil	Rob de Jeu
12:00 - 14:00	☕ at 13:00	Lunch ☺	Lunch ☺	Lunch ☺	Lunch ☺
14:00 - 15:00	Steven Lu	Gregory Pearlstein	Francis Brown	Henri Gillet	Ramesh Sreekantan
15:00 - 15:30		☕	☕	☕	☺
15:30 - 16:30		Junmyeong Jang	Herbert Gangl	Wayne Raskind	

Abstracts:

Speaker: **Marie-José Bertin** (Université Pierre et Marie Curie (Paris 6), Institut de Mathématiques de Jussieu)

Title: **The Mahler measure of curves and surfaces**

Abstract: I report on some new examples of explicit logarithmic Mahler measures of multivariate polynomials.

When the polynomial defines a parametrizable curve, its Mahler measure is expressed in terms of Bloch-Wigner dilogarithms of an element of the Bloch group of an imaginary quadratic field (Thus a link with hyperbolic varieties).

When the polynomial defines a singular $K3$ -surface, I give several examples of the Mahler measure expressed in terms of the L -series of the $K3$ -surface for $s = 3$.

Speaker: **Francis Brown** (CNRS, Institut de Mathématiques de Jussieu, IHES)

Title: **Dedekind zeta motives for totally real fields**

Speaker: **José Ignacio Burgos Gil** (Universidad de Barcelona)

Title: **On singular Bott-Chern classes**

Abstract: The singular Bott-Chern classes measure the failure of an exact Riemann-Roch theorem for closed immersions at the level of currents. They are the key ingredient in the definition of direct images of hermitian vector bundles under closed immersions and in the proof of the arithmetic Riemann-Roch theorem in Arakelov geometry for closed immersions.

There are two definitions of singular Bott-Chern classes. The first due to Bismut, Gillet and Soul uses the formalism of super connections. The second, due to Zha, is an adaptation of the original definition of Bott-Chern classes by Bott and Chern.

In this talk we will give an axiomatic characterization of singular Bott-Chern classes, which is similar to the characterization of Bott-Chern forms, but that depends on the choice

of an arbitrary characteristic class. This characterization allow us to give a new definition of singular Bott-Chern forms by means of the deformation to the normal cone technique and to compare the previous definitions of singular Bott-Chern forms.

Moreover we will give an explicit computation of the characteristic class associated to Bismut-Gillet-Soul definition of singular Bott Chern currents.

Speaker: **Rob de Jeu** (Vrije Universiteit Amsterdam)

Title: **TBA**

Speaker: **Elisenda Feliu** (Universidad de Barcelona)

Title: **TBA**

Speaker: **Herbert Gangl** (University of Durham)

Title: **TBA**

Speaker: **Henri Gillet** (University of Illinois at Chicago)

Title: **TBA**

Speaker: **Junmyeong Jang** (Purdue University)

Title: **Generic p -rank of semi-stable fibration**

Abstract: In this presentation, I will be concerned with two pathological phenomenons of positive characteristic, the failure of Miyaoka-yau inequality and the failure of semi-positivity theorem. Szpiro showed that a Frobenius base change of non-isotrivial smooth fibration violates Miyaoka-Yau inequality. For such a fibration, if the p -rank of the generic fiber is maximal, the dimension of the Lie algebra of Picard scheme is stable after the Frobenius base change. Using this fact and a reduction argument we can construct a counter example of Miyaoka-Yau inequality with smooth Picard scheme, which is a counterexample of Parshin's expectation. And we will see for a semi-stable fibration $\pi : X \rightarrow C$ of a proper smooth surface to a proper smooth curve, if the p -rank of the generic fiber is maximal, the semi-positivity theorem holds and if the p -rank of the generic fiber is 0, some Frobenius base change of π violates the semi-positivity theorem. This result may be applied to a problem of the distribution of p -ranks of reductions of a certain non-closed point in the moduli space of curves over $\bar{\mathbb{Q}}$.

Speaker: **Matthew Kerr** (University of Durham)

Title: **The Abel-Jacobi map on the Einsestein symbol**

Abstract: In this talk we consider two different constructions of motivic cohomology classes on families of toric hypersurfaces and on Kuga varieties. Under certain modularity conditions on the former we say how the constructions “coincide”, obtaining a complete explanation of the phenomenon observed by Villegas, Stienstra, and Bertin in the context of Mahler measure. (This is where the AJ computation on the Kuga varieties, done using our formula with J. Lewis and S. Mueller-Stach, will be summarized). We also look at an application of the toric construction in the non-modular case, to limits of normal functions for families of Calabi-Yau 3-folds.

Speaker: **Steven Lu** (Université du Québec à Montréal)
Title: **TBA**

Speaker: **Kumar Murty** (University of Toronto)
Title: **Twisted averages of L -functions**

Speaker: **Greg Pearlstein** (Michigan State University)
Title: **TBA**

Speaker: **Wayne Raskind** (University of Southern California)
Title: **TBA**

Speaker: **Ramesh Shreekantan** (University of Toronto)
Title: **TBA**

Speaker: **Sampei Usui** (Osaka University)
Title: **Moduli of polarized logarithmic Hodge structures and period maps**

Speaker: **Xiaowei Wang** (The Chinese University of Hong Kong)
Title: **Height and GIT weight**

Abstract: In this talk, we will establish a new connection between the weight in the geometric invariant theory and the height introduced by Cornalba and Harris CH and Zhang Z. Then I will explain two applications of this connection.