



BOOK OF ABSTRACTS



A Tale of Algebra and Geometry

A Conference to celebrate Angelo Vistoli's 60th Birthday

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Abstracts

DAN ABRAMOVICH

Brown University

Resolution of singularities in Vistoli's workshop.

Among the things one learns from Vistoli is how to handle some magnificent power tools, two of which are the theory of algebraic stacks and logarithmic geometry. I will describe joint work with Michael Temkin and Jarosław Włodarczyk on functorial resolution of singularities of varieties and their families, where lessons I learned from Vistoli, and in particular the art of logarithmic stack maintenance, are central.

NIELS BORNE

Université de Lille 1

The Verschiebung of the moduli space of Higgs bundles.

I will report on a work in collaboration with Cédric Pépin, and still in progress. Given a smooth projective curve over an algebraically closed field of positive characteristic, we show that the Verschiebung of the moduli space of Higgs bundles has finite fibers over generically semi-simple regular characteristics.

PATRICK BROSANAN

University of Maryland

Monodromy invariants and palindromicity.

Suppose X is a projective family of varieties over a base scheme Y with X and Y smooth varieties. Generically the family is smooth. So one gets a mon-

odromy action of the fundamental group of a Zariski open subset U of Y on the cohomology groups of the fibers over U . The local invariant cycle theorem of Beilinson, Bernstein and Deligne says that the cohomology of a singular fiber surjects onto the local monodromy invariants of the cohomology of the nearby smooth fibers. I will explain joint work with Tim Chow which shows that this surjection is, in fact, an isomorphism when the singular fiber has palindromic cohomology. I will also sketch the application to Hessenberg varieties and a conjecture of Shareshian and Wachs.

LUCIA CAPORASO
Università degli studi Roma Tre

Moduli spaces old and new.

The talk will be an overview on the development of the theory of moduli spaces of curves and related objects.

ALESSIO CORTI
Imperial College London

Smoothings of Gorenstein toric Fano varieties and singularities.

Let P be a lattice polytope having 0 in its interior and whose vertices are primitive lattice vectors. To P is naturally associated a toric Fano variety X_P : this is the toric variety whose fan is the spanning fan of P . I want to classify smoothings of X_P or, more generally, deformations of X_P to a mildly singular variety. I will tell you some of what I know about this problem. This will involve some discussion of mirror symmetry for Fano varieties and for singularities.

HÉLÈNE ESNAULT
Freie Universität Berlin

p -curvature and companions.

I'll give a small survey of problems and theorems concerning the behavior of connections in reduction mod p , and on companions, based on joint work with M. Kisin, T. Abe and M. Groechenig.

BARBARA FANTECHI
SISSA

Differentiable structures on the stack of J-holomorphic stable maps.

Gromov-Witten invariants can be defined for compact symplectic manifolds and for smooth projective varieties over an arbitrary field. In fact, in the symplectic world several definitions are possible. It is expected that all definitions agree for smooth complex projective varieties; some results exist in the literature, but they do not cover the full range of existing definitions on the symplectic side. In this joint work with D. McDuff and K. Wehrheim we recast the ambient space of the polyfold definition in stacky terms, as a first step towards establishing a comparison result.

TOM GRABER
Caltech

Localization on (virtually) log smooth spaces.

I will describe work in progress on torus localization methods for evaluating virtual integrals on spaces like the space of logarithmic stable maps.

BRENDAN HASSETT
Brown University

Stable rationality and root stacks.

We show that stable rationality is not a deformation invariant of smooth projective complex threefolds. Root stack constructions play an important role in the argument. This is joint work with Kresch and Tschinkel.

MARC LEVINE
Universität Duisburg-Essen

Characteristic classes in Witt cohomology.

As part of a program for constructing invariants of enumerative problems with values in the Grothendieck-Witt ring, refining the classical integer invariants, we are developing a calculus of characteristic classes of vector bundles with values

in the cohomology of the sheaf of Witt rings. This cohomology theory is the “real twin” of the classical theory of the Chow ring and the more modern motivic cohomology, and the characteristic classes are algebro-geometric versions of the theory of Pontryagin classes and Euler classes. Building on Ananyevskiy’s SL_2 -splitting principle, we will describe a splitting principle that enables one to have a calculus of these characteristic classes, where the normalizer of the usual torus in SL_2 replaces \mathbb{G}_m .

MARTIN OLSSON
University of California, Berkeley

Specialization of fundamental groups for log schemes.

I will discuss various results about specialization maps for fundamental groups of log schemes. In particular explain an étale analog of a result of Nakayama and Ogus on variation of fundamental groups in families.

ZINOVY REICHSTEIN
The University of British Columbia

Two types of problems in algebra.

Let p be a prime integer. I will say that a field extension L/K is prime-to- p if the degree $[L : K]$ is finite and not divisible by p . In this informal and mostly meta-mathematical talk, I will discuss two types of problems concerning objects defined over fields K (such as algebras, homogeneous polynomials, algebraic varieties, etc.) I will refer to problems that are insensitive to prime-to- p extensions as “Type 1” and those that are as “Type 2”. Many problems can be naturally subdivided into “Type 1” and a “Type 2” components. My main observation is that virtually all of the tools we have at our disposal are capable of proving Type 1 theorems only, while many of the long-standing open problems are of Type 2. I discuss multiple examples illustrating this philosophy.

CARLOS SIMPSON
Université de Nice

Parabolic Higgs bundles of the Geometric Langlands correspondence on the moduli space of bundles over a genus 2 curve.

This is joint work in progress with R. Donagi and T. Pantev. The Geometric Langlands Correspondence predicts the existence of certain D -modules over the

moduli stack of vector bundles on a curve. In particular, this predicts local systems over an open subset of the space of stable bundles. Donagi and Pantev have formulated a strategy for producing the parabolic Higgs bundles that are associated to these local systems, using the nonabelian Hodge correspondence due to Mochizuki. Here, we consider the moduli space of stable bundles of odd degree on a genus 2 curve. One has the vector bundle on this variety obtained by pushforward from a general fiber of the Hitchin fibration, and it has a logarithmic Higgs field. We then impose a parabolic structure along the “wobbly locus”. We are looking at the question of how, with an appropriate choice of parabolic weight, to obtain vanishing of the first and second parabolic Chern classes.

MATTIA TALPO
Simon Fraser University

Derived invariance of parabolic sheaves.

Parabolic bundles are a certain kind of decorated vector bundles, that were first introduced by Mehta and Seshadri on punctured Riemann surfaces in the 80s. Their definition has been generalized and refined by many authors over the years, until Borne and Vistoli gave a definition of a parabolic sheaf on a general logarithmic scheme around 2010.

I will briefly recall the definition of these objects, and then talk about a somewhat surprising invariance property of their derived category with respect to some kinds of blow-ups. As I will explain, this follows from a "logarithmic" version of the derived McKay correspondence of Bridgeland, King and Reid, that I developed in a joint work with Sarah Scherotzke and Nicolò Sibilla.

BERTRAND TOËN
Université de Toulouse

On the Bloch’s conductor formula.

In this talk I will present an approach to the Bloch’s conductor formula based on a trace formula for non-commutative schemes. This is a report on a joint ongoing project with Gabriele Vezzosi.

FABIO TONINI
Freie Universität Berlin

Representations of the Nori fundamental gerbe.

The Nori fundamental group scheme of a scheme X with a rational point x is a profinite group scheme that "controls" torsors over X under finite group schemes with a trivialization on x . Interpreting a group scheme as a trivial gerbe, one can more generally associate a profinite gerbe, called the Nori fundamental gerbe, without the need of a rational point. In both cases Tannaka's duality assures those objects (affine group schemes or affine gerbes) are completely determined by their category of representations. In the talk I will give a description of the category of representations of the Nori fundamental gerbe by considering vector bundles with extra structure.