Title / Abstract

Fabrizio Catanese

Title: Teichmueller spaces and automorphisms acting topologically trivially
Abstract. The question to determine automorphisms acting trivially on cohomology was motivated by the research on Torelli type problems. Of course, the question is to understand those which are not in the connected component of the identity, i.e. the quotient $A(X) = \mathrm{Aut}(X)/\mathrm{Aut}^0(X)$.

Since Teichmueller space is the quotient of the space $CS(X)$ of the complex structures by the group $\mathrm{Diff}^0(X)$, it is of particular interest to understand the subgroup of $\mathrm{Aut}(X)$ given by the elements isotopic to the identity, i.e. in $\mathrm{Diff}^0(X)$, especially to compare Kuranishi and Teichmueller space.

For varieties of general type $\mathrm{Aut}(X)$ is finite, and the rigidification conjecture is that there are no automorphisms isotopic to the identity. I shall present some results on Teichmueller spaces, some examples of isomorphism isotopic to the identity but not in $\mathrm{Aut}^0(X)$, automorphisms of surfaces of general type acting trivially on cohomology, or just on rational cohomology but not on integral cohomology.

This is work in progress with Wenfei Liu, Greg Gromadtzki.

Jun-Muk Hwang

Title: Normal Legendrian Singularities
Abstract. A germ of a Legendrian subvariety in a holomorphic contact manifold is called a Legendrian singularity. Legendrian singularities are usually not normal. We look at some examples of normal Legendrian singularities and discuss their rigidity under deformation.

Young-Hoon Kiem

Title: 30 Years of Partial Desingularization
Abstract. Geometric invariant theory (GIT) quotients of smooth projective varieties are often singular. By Luna's slice theorem, the singularities arise from non-trivial stabilizers and often bigger stabilizers result in worse singularities. In 1985, Frances Kirwan invented an algorithm, called the partial desingularization pocess, that systematically resolves all the singularities worse than orbifold singularities by a sequence of blowups. In this talk, I'd like to discuss applications of the partial desingularization process during the past 30 years, in the theory of moduli of vector bundles on curves, in birational geometry of moduli spaces, and in the construction of symplectic varieties. Finally, I'd also like to talk about a recent joint work with Jun Li and Michail Savvas about a theory of generalized Donaldson-Thomas invariant by partial desingularization.

Igor Krylov

Title: Stability of del Pezzo surfaces over rings
Abstract. Kollár introduced a generalization of GIT stability for hypersurfaces: stability over rings. This notion is useful for finding good reductions to finite characterstic and for finding good (semistable) birational models of fibrations. I will talk about extending

this notion to del Pezzo surfaces of degree 1 and 2. These surfaces are hypersurfaces in weighted projective spaces, where GIT techniques do not work. On the other hand embeddings into the projective spaces are not complete intersections and are difficult to work with. I will talk about generalizations of stability in both of these settings. In particular, I will talk about parameter spaces of del Pezzo surfaces of degrees 1 and 2.

Cheolgyu Lee

Title: On a geometric meaning of Hesselink stratification
Abstract. For an arbitrary hypersurface X, there is the set $m(X)$ of multiplicities of a point in X. In this talk, we will recover the set of possible multiplicity of an arbitrary hypersurface from the hesselink stratification of a Hilbert scheme.

Jinhyun Park

Title: On the motivic cohomology of fat points
Abstract. We give a new algebraic cycle complex that may serve as a candidate model for the motivic cohomology of singular schemes such as fat points. To test the validity of this model, we explicitly compute its simplest case. Interesting new techniques such as non-archimedean analysis and deformation theory enter into the picture. We discuss a few aspects of this model beyond those computations. This is based on a joint work with Sinan Ünver.

Jun-Yong Park

Title: Arithmetic of the moduli of semistable elliptic surfaces
Abstract. We consider the moduli of nonsingular semistable elliptic fibrations over $\mathbb{P}^1$, also known as semistable elliptic surfaces, with $12n$ nodal singular fibers and a distinguished section. We establish a bijection of K-points between the moduli and the stack of morphisms $\mathcal{L}_{1,12n} = \mathrm{Hom}_n(\mathbb{P}^1, \bar{\mathcal{M}}_{1,1})$ where $\bar{\mathcal{M}}_{1,1}$ is the DeligneMumford stack of stable elliptic curves and K is any field of characteristic not equal to 2, 3. We show that the class in the Grothendieck ring of K-stacks of $\mathrm{Hom}_n(\mathbb{P}^1, P(a,b))$, where $P(a,b)$ is a 1-dimensional (a,b) weighted projective stack, is equal to $L^{(a+b)n+1} - L^{(a+b)n-1}$. As a corollary, we acquire the motive of the moduli stack $L_{1,12n}$ is $L^{10n+1} - L^{10n-1}$ which implies that the cardinality of the set of weighted $\mathbb{F}_q$-points to be $\#q(L_{1,12n}) = q^{10n+1} - q^{10n-1}$. In the end, we pass the acquired arithmetic invariant through the global fields analogy which renders a new heuristic of $Z_{\mathbb{Q}}(B)$ for counting the semistable elliptic curves over $\mathbb{Q}$ by the bounded height of discriminant Δ. Joint work with Changho Han.