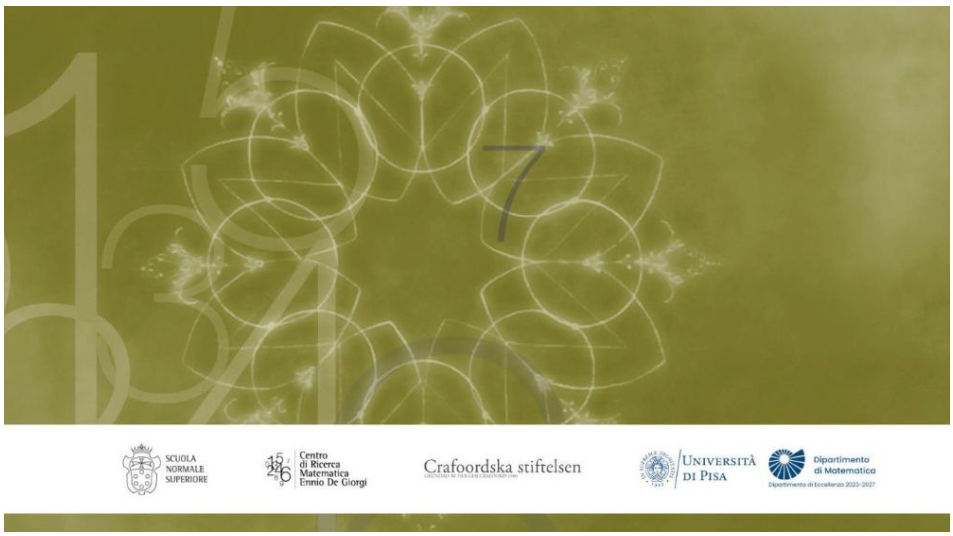
Moduli of curves, surfaces and their invariants



Report of Contributions

https://indico.sns.it/e/98

Contribution ID: **1** Type: **not specified**

Fineness and smoothness of a KSBA moduli of marked cubic surfaces

Wednesday, 1 October 2025 16:00 (1 hour)

Primary author: Dr SCHAFFLER, Luca (University of Roma Tre)

Presenter: Dr SCHAFFLER, Luca (University of Roma Tre)

Contribution ID: **3** Type: **not specified**

Hodge theory and projective structures on compact Riemann surfaces

Thursday, 2 October 2025 14:30 (1 hour)

A projective structure on a compact Riemann surface is an equivalence class of projective atlases, i.e., an equivalence class of coverings by holomorphic coordinate charts such that the transition functions are all Moebius transformations. Any compact Riemann surface admits two canonical projective structures: one coming from uniformization's theorem, and one from Hodge theory. These yield two (different) families of projective structures over the moduli space Mg of compact Riemann surfaces. We wish to compare them and give a characterization of the Hodge theoretic family.

Primary author: Dr TAMBORINI, Carolina (Universität Duisburg-Essen)

Presenter: Dr TAMBORINI, Carolina (Universität Duisburg-Essen)

Contribution ID: **4** Type: **not specified**

Automorphisms of Jacobians and Simplicity

Thursday, 2 October 2025 10:00 (1 hour)

The study of abelian varieties with non-trivial endomorphism algebras is a classical topic in algebraic geometry. A fundamental result by Shimura classifies all families of principally polarized abelian varieties whose endomorphism algebras properly contain \mathbb{Z}. However, a complete analogous classification for Jacobians remains open. In this talk, we investigate certain families of Jacobians arising from unramified cyclic coverings of hyperelliptic curves. By using a deformation argument, we provide a full description of their (non-trivial) endomorphism algebras and prove that the generic Jacobian in these families is simple.

Primary author: Dr SPELTA, Irene (HU Berlin)

Presenter: Dr SPELTA, Irene (HU Berlin)

Contribution ID: **5** Type: **not specified**

Brauer groups and (non-negligible) cohomology classes on moduli of curves via theta characteristics

Wednesday, 1 October 2025 14:30 (1 hour)

In joint work with Andrea di Lorenzo we computed the Brauer groups of the moduli stacks of genus three curves and abelian varieties of dimension three. A crucial step involved constructing explicit classes by leveraging odd theta characteristics and the map they induced to the moduli stack of étale algebras of degree 28. Three problems remained open: computing the pullback map from the Brauer group of the moduli stack of genus three curves to that of hyperelliptic genus three curves, computing the full cohomological invariants of the moduli stack of genus three curves, and whether theta characteristics induce higher nontrivial cohomology classes for higher genus.
In this talk I will describe recent joint work with Andrés Jaramillo Puentes where we answer the first and third question, showing that the pullback between Brauer groups is injective and producing new mod 2 cohomology classes (of degree 2^(g-1)) on the moduli stacks of genus g curves and dimension g abelian varieties over a totally real field.
These classes are, borrowing a term from Serre's study of group cohomology, non-negligible, and in particular cannot come from the cycle map.

Primary author: Prof. PIRISI, Roberto (University of Naples Federico II)

Presenter: Prof. PIRISI, Roberto (University of Naples Federico II)

Contribution ID: **6** Type: **not specified**

Divisors on moduli spaces of K3 surfaces

Wednesday, 1 October 2025 10:00 (1 hour)

We will discuss various aspects of the divisor geometry of moduli spaces of K3 surfaces. We provide a finite generating set of Noether—Lefschetz divisors for the Picard group, study the structure of the NL-cone, and establish numerical criteria for when a NL divisor on a moduli space of quasi-polarized K3 surfaces F_{2d}, or more generally on an orthogonal modular variety, generates an extremal ray in the cone of pseudoeffective divisors. This is based on joint works with L. Flapan, R. Zuffetti, and Shi He.

Primary author: Prof. BARROS, Ignacio (University of Antwerp, Antwerp)

Presenter: Prof. BARROS, Ignacio (University of Antwerp, Antwerp)

Contribution ID: **7** Type: **not specified**

Bounding Brauer groups of K3 surfaces using moduli spaces

Wednesday, 1 October 2025 11:30 (1 hour)

The Brauer group of an algebraic variety is a group with many applications, in particular to the study of rational points. For a K3 surface over a number field, the transcendental part of its Brauer group is finite. It was shown by Cadoret-Charles that the size of its p primary torsion is uniformly bounded for K3 surfaces in one-dimensional families.
We give a different proof of this result for one-dimensional families of K3 surfaces with a polarization by a fixed lattice. To be precise, we construct moduli spaces of K3 surfaces with a lattice polarization and a Brauer class, and use the geometry of their complex points to prove boundedness of Brauer groups for the K3 surfaces they parametrize. I will explain the construction and give a sketch of the proof of our boundedness result. This is joint work with D. Bragg and A. Várilly-Alvarado.

Primary author: Dr BRAKKEE, Emma (Leiden University)

Presenter: Dr BRAKKEE, Emma (Leiden University)

Contribution ID: **8** Type: **not specified**

Weighted blow-up in nature: wall crossings for Log-Hilbert stacks of points on curves.

Friday, 3 October 2025 11:30 (1 hour)

Weighted blow-ups are a birational transformation that naturally appears in moduli spaces. One instance where this happens, is when studying the logarithmic Hilbert scheme of points on a curve C equipped with a log structure. Today we will give a quick introduction to both weighted blow-ups and logarithmic Hilbert schemes of points on curves. Then we will focus our attention on the examples of two and three points on $(P^1|0)$ and will describe the wall crossings between the classical Hilbert scheme of points and the logarithmic ones via weighted blow-ups.

Primary author: Dr ARENA, Veronica (University of Cambridge)

Presenter: Dr ARENA, Veronica (University of Cambridge)

Contribution ID: **9** Type: **not specified**

Vector bundles on polyhedral complexes

Tuesday, 30 September 2025 16:00 (1 hour)

Logarithmic geometry is a language that combines piecewise-linear and algebraic geometry, particularly useful for tracking the combinatorics of compactifications and degenerations of algebraic varieties. Olsson's stack of logarithmic structures, and its charts provided by Artin cones, have played a fundamental role in moduli theory and enumerative geometry. Recent developments concerning stability, good moduli spaces, and logarithmic sheaf theory show the utility of considering Artin fans over a base, or Olsson fans. In joint work with Francesca Carocci and Jonathan Wise, we study their structure and vector bundles over them, generalising the theory of equivariant bundles on toric varieties. If time permits, I will discuss the relationship with Grassmannians and limit linear series that motivated our investigation.

Primary author: Dr BATTISTELLA, Luca (University of Bologna)

Presenter: Dr BATTISTELLA, Luca (University of Bologna)

Contribution ID: **10** Type: **not specified**

Pointed Hurwitz-Brill-Noether Theory

Friday, 3 October 2025 10:00 (1 hour)

We study the geometry of Hurwitz–Brill–Noether spaces with imposed vanishing conditions at a totally ramified point. These spaces arise naturaly as degenerations of Hurwitz-Brill-Noether loci. Our methods significantly simplify the combinatorics involved in this study, and I will present some applications in low gonality. This is joint work with Richard Haburcak.

Primary author: Dr BUD, Andrei (Goethe University, Frankfurt)

Presenter: Dr BUD, Andrei (Goethe University, Frankfurt)

Contribution ID: **11** Type: **not specified**

FA modules and holomorphic forms on moduli spaces of stable curves.

Tuesday, 30 September 2025 11:30 (1 hour)

I will discuss the combinatorial notion of FA modules and how they appear in the holomorphic part of the cohomology of moduli spaces of stable curves. In particular, I will give a complete description of holomorphic 17 forms on the moduli space of stable curves of genus g with n marked points for all g and n. This is joint work with Hannah Larson, Sam Payne, and Thomas Willwacher.

Primary author: Dr CANNING, Samir (ETH Zurich)

Presenter: Dr CANNING, Samir (ETH Zurich)

Contribution ID: **12** Type: **not specified**

Pseudo-holomorphic curves with a fixed complex structure in positive symplectic manifolds

Thursday, 2 October 2025 16:00 (1 hour)

In this talk, I will show that fixed-domain Gromov–Witten invariants of a positive symplectic manifold (e.g., a smooth Fano variety) count J-holomorphic curves in X satisfying prescribed incidence conditions. This provides a symplectic analogue of a conjecture of Lian and Pandharipande, recently disproved in the algebraic setting by Beheshti, Lehmann, Lian, Riedl, Starr, and Tanimoto. The proof relies on constructing the fixed-domain Gromov–Witten pseudocycle without the use of inhomogeneous or domain-dependent perturbations, answering an old question posed by Ruan and Tian.

Primary author: Dr CELA, Alessio (University of Cambridge)

Presenter: Dr CELA, Alessio (University of Cambridge)

Contribution ID: **13** Type: **not specified**

Fourier-Mukai transform and the class of sections

Thursday, 2 October 2025 11:30 (1 hour)

One of the central objects in the intersection theory of curves is the tautological ring. In the last 30 years, remarkable progress has been made in our understanding of the tautological ring, largely due to the connection between the geometry of curves and the geometry of stable maps. Compactified abelian fibrations, and compactified Jacobians in particular, also have tautological rings, but the study of their structure requires different ideas. In this talk, I will explain how the structure of these rings can be controlled through the interaction between certain Fourier-Mukai transforms and logarithmic geometry. This is based on joint work with Bae and Pixton.

Primary author: Dr MOLCHO, Samouil (University of Rome 'La Sapienza')

Presenter: Dr MOLCHO, Samouil (University of Rome 'La Sapienza')

Contribution ID: **14** Type: **not specified**

Rational cohomology of M_{4,1}

Tuesday, 30 September 2025 10:00 (1 hour)

The moduli space M_{g,n} of non-singular curves of genus g and n marked points and its compactification, have been central objects in algebraic geometry for many years.
However, lot is still unkown about their geometry, in particular from the point of view of the rational cohomology: this is completly known only for some values of g,n. We will review what is known and focus mainly on M_{g,n}.
Most of the known cases for which the rational cohomology is completely known are due to Tommasi, via Gorinov-Vassiliev's method.
We will briefly describe such a method, used to compute the rational cohomology of M_{4,1} in a joint work with Yiu Man Wong.

Primary author: Dr ZHENG, Angelina (University of Tübingen)

Presenter: Dr ZHENG, Angelina (University of Tübingen)

Contribution ID: **15** Type: **not specified**

Moduli stacks of genus one (Gorenstein) curves with projective good moduli spaces

Tuesday, 30 September 2025 14:30 (1 hour)

The search for alternative compactifications of the moduli space of smooth curves has been central in the panorama of moduli spaces. A possible way to construct such compactifications is allowing curves with worse-than-nodal singularities in the moduli problem and imposing some stability conditions using the combinatorics of the curves to get the desired moduli space. We classify the open substacks inside the moduli stack $\mathcal{G}_{1,n}$ of n-pointed Gorenstein curves of genus one which admits a proper good moduli space. They agree with those defined by Bozlee, Kuo and Neff. Moreover, we will prove that these spaces are actually projective and we will explain why the classification is a consequence of a wall-crossing phenomenon. This is a on-going project with Luca Battistella and Andrea Di Lorenzo.

Primary author: PERNICE, Michele (KTH Stockholm)

Presenter: PERNICE, Michele (KTH Stockholm)