

Seminario di Algebra & Geometria
Dipartimento di Matematica “Guido Castelnuovo”
SAPIENZA Università di Roma
A.A. 2021/2022

Mercoledì 29 Settembre 2021 - ore 14:00

Nicolas Tholozan (DMA/ENS - CNRS)

Equidistribution of Noether-Lefschetz loci

Let $V \rightarrow B$ be a holomorphic family of smooth complex projective and polarized varieties. The Noether-Lefschetz locus of B is the set of points x where the Picard rank jumps, i.e. where $H_2(V_x)$ has exceptional integral classes of type $(1, 1)$.

I will explain that, when B has the correct dimension, the Noether-Lefschetz locus “equidistributes” toward a smooth volume form given by a characteristic class of the Hodge bundle.

The proof uses homogeneous dynamics and reduces to a study of the invariant cohomology of period domains. This is a joint work with Salim Tayou.

Mercoledì 6 Ottobre 2021 - ore 14:00

Sebastian Goette (Albert-Ludwigs-Universität Freiburg)

Extra twisted connected sums and their v -invariants

Riemannian Manifolds with holonomy G_2 are interesting both for geometers and for theoretical physicists.

I will give a short introduction into the basics of G_2 -geometry. I will then introduce the Crowley-Nordström v -invariant and describe the extra twisted sum construction.

As a result, we will see that the moduli space of metrics with holonomy G_2 is disconnected for some closed 7-manifolds.

Mercoledì 13 Ottobre 2021 - ore 14:00

Boris Vertman (Universität Oldenburg)

Yamabe flow on smooth and singular spaces: old and new results

Yamabe flow is an intrinsic geometric flow that deforms the metric of a Riemannian manifold. If the flow converges, it deforms the metric to a metric of constant scalar curvature with the sign depending on the sign of the Yamabe invariant.

However convergence of the flow is an intricate problem, already in the setting of smooth compact manifolds. The problem is surprisingly closely related to the positive mass theorem.

We discuss the classical results in the area, as well as the recent progress in the setting of stratified spaces.

This is joint work with Gilles Carron and Jorgen Olsen Lye.

Mercoledì 20 Ottobre 2021 - ore 14:00

Jacopo Gandini (Università di Bologna)

Sulla moltiplicazione delle funzioni sferiche di uno spazio omogeneo affine senza molteplicità di tipo A

Sia G un gruppo algebrico semplice definito sui complessi e sia K un sottogruppo riduttivo di G , chiuso nella topologia di Zariski. La varietà omogenea G/K è detta senza molteplicità se ogni componente isotipica che appare nella decomposizione dell'anello delle coordinate $C[G/K]$ come G -modulo è irriducibile. In questa situazione, la struttura di $C[G/K]$ come G -modulo è ben compresa in termini di opportuni invarianti combinatorici associati a G/K . Meno compresa è invece la sua struttura di G -algebra. In questo intervento considererò il problema di decomporre in irriducibili il prodotto in $C[G/K]$ di due sottomoduli irriducibili. Mi concentrerò in particolare sul caso in cui il sistema di radici associato a G/K è di tipo A: in questo caso un ruolo fondamentale nella risoluzione del problema è giocato dai polinomi di Jack, e in particolare da una congettura di Stanley del 1989. L'intervento è basato su un lavoro in collaborazione con Paolo Bravi.

Mercoledì 3 Novembre 2021 - ore 14:00

Amos Turchet (Università di Roma Tre)

Special varieties and hyperbolicity

Campana proposed a series of conjectures relating algebro-geometric and complex-analytic properties of algebraic varieties and their arithmetic. The main ingredient is the definition of the class of special varieties, which conjecturally identifies the class of varieties with a potentially dense set of rational points (when defined over a number field) and admitting a dense entire curve (when defined over the complex numbers).

In the talk we will review the main conjectures and constructions, and we will discuss some recent results that give evidence for some of these conjectures.

This is joint work with E. Rousseau and J. Wang.

Mercoledì 10 Novembre 2021 - ore 14:00

Gérard Besson (Université Grenoble-Alpes)

Finiteness Theorems for Gromov-Hyperbolic Groups

This is a joint work with G. Courtois, S. Gallot and A. Sambusetti.

We shall prove that, given two positive numbers δ and H , there are finitely non cyclic torsion-free δ -hyperbolic marked groups (Γ, Σ) satisfying $\text{Ent}(\Gamma, \Sigma) \leq H$, up to isometry (of

marked groups). Here a marked group is a group Γ together with a symmetric generating set Σ and Ent is the entropy of the marked group.

The talk is intended to be elementary; the purpose is to define all these notions and give a flavour of the proof.

Mercoledì 10 Novembre 2021 - ore 14:00

Roman Bezrukavnikov (MIT)

Centers as cohomology, representations and microlocal sheaves

In a pioneering 1981 paper De Concini and Procesi provided a beautiful description for cohomology of fixed point sets (Springer fibers) $(G/B)_e$ in type A. This was an important precursor to two later developments: Khovanov's conjecture, proved by Brundan and Stroppel, identifying that cohomology with the center of a parabolic category \mathcal{O} ; and a conjectural generalization of the description of $H^((G/B)_e)$ in the context of symplectic duality formulated by Khikita. I will mention a conceptual framework for Khovanov's conjecture and its generalizations beyond type A which involves a realization of Koszul dual to parabolic category \mathcal{O} in terms of microlocal sheaves. The main results will have to do with a similar construction in the affine context, identifying Koszul dual to modules over the small quantum group with microlocal sheaves on an affine Springer fiber and describing the center of that category in terms of cohomology of an affine Springer fiber. Based on joint projects in progress with Boixeda Alvarez, McBreen and Yun and with Boixeda Alvarez, Shan and Vasserot.*

Mercoledì 24 Novembre 2021 - ore 14:00

Leandro Arosio (Università di Roma "Tor Vergata")

Horospheres in several complex variables

A horocycle in the unit disk of the complex plane is a euclidean disk which is internally tangent to a point p of the boundary of the disk. Horocycles are limits of Poincaré balls as the center moves towards the point p while the radius grows suitably.

The classical Julia lemma is a boundary version of the Schwarz lemma and shows that horocycles are useful to understand the behaviour of a holomorphic self-map of the disk near a point of the boundary.

In this talk we deal with the generalization of this concept to several complex variables: horospheres. The existence of horospheres in bounded strongly convex domains of \mathbb{C}^n was proved by Abate in 1988 using Lempert's theory of complex geodesics, but it is difficult to generalize such proof to bounded strongly pseudoconvex domains, which is the natural class of domains to study in this context.

In this talk I will show how to obtain this generalization following a different route, that is, proving that the horofunction compactification of the domain is topologically equivalent to its Gromov compactification.

This is a joint work with Matteo Fiacchi, Sébastien Gontard, and Lorenzo Guerini.

Mercoledì 1 Dicembre 2021 - ore 14:00

Paolo Rossi (Università di Padova)

Moduli spaces of residueless meromorphic differentials and the KP hierarchy

I'll present a recent joint work with A. Buryak and D. Zvonkine, where we study the moduli spaces of residueless meromorphic differentials, i.e., the closures, in the moduli space of stable curves, of the loci of smooth curves whose marked points are the zeros and poles of prescribed orders of a meromorphic differential with vanishing residues. Our main result is that intersection theory on these spaces is controlled by an integrable system containing the celebrated Kadomtsev-Petviashvili (KP) hierarchy as a reduction to the case of differentials with exactly two zeros and any number of poles. This fact has several deep consequences and in particular it relates the aforementioned moduli spaces with Hurwitz theory, representation theory of $sl_2(\mathbb{C})$, integrability and a conjecture of Schmitt and Zvonkine on the $r=0$ limit of Witten's r -spin classes.

Mercoledì 22 Dicembre 2021 - ore 14:00

Daniele Angella (Università di Firenze)

The Hermitian geometry of the Chern connection

We consider some problems concerning the geometry of the Chern connection, including: metrics with constant Chern-scalar curvature; the generalizations of the Kähler-Einstein condition to the non-Kähler setting; the convergence of the normalized Chern-Ricci flow on compact complex surfaces.

The talk is based on collaborations and discussions with Simone Calamai, Francesco Pediconi, Cristiano Spotti, Valentino Tosatti.

Mercoledì 12 Gennaio 2021 - ore 14:00

Florent Blacheff (Universitat Autònoma de Barcelona)

Around volume and macroscopic scalar curvature

L. Guth proved the following theorem: if a hyperbolic manifold endowed with an auxiliary Riemannian metric has sufficiently small volume in comparison to the hyperbolic one, then we can find in its universal cover a ball of radius 1 whose volume is bigger than a hyperbolic ball of radius 1. This theorem is strongly related to a conjecture by R. Schoen, and is conjectured to hold for any radius. In this talk, I will present some new results around this topic. Based on a joint work with S. Karam.

Mercoledì 26 Gennaio 2022 - ore 14:00

Paolo Aceto (Université de Lille)

Definite fillings of plumbed 3-manifolds

Motivated by the study of smoothings of rational surface singularities as well as symplectic fillings of plumbed 3-manifolds, we consider an analogue problem in a purely topological setting. The question of when a rational surface singularity admits a unique smoothing is of particular interest and has led to a conjecture of Kollár which has been proved in some cases.

We look at smooth, definite fillings of certain plumbed manifolds and consider the question of which intersection forms can be realized by such fillings. We describe various constructions and an obstruction based on Donaldson's diagonalization theorem. Finally, we present a couple of uniqueness results and discuss their relevance for Kollár's conjecture as well as the problem of embedding lens spaces in certain 4-manifolds.

While the main motivation lies in problems from singularity theory, our results are purely topological in nature and the main techniques used are algebro-combinatorial.

This is joint work with Duncan McCoy and JungHwan Park.

Mercoledì 2 Febbraio 2022 - ore 14:00

Ana Kontrec (Max-Planck-Institut Bonn and University of Zagreb)

Bershadsky-Polyakov vertex algebras at positive integer levels and duality

One of the simplest examples of W -algebras is the Bershadsky-Polyakov vertex algebra $W^k(g, f)$, associated to $g = \mathfrak{sl}(3)$ and the minimal nilpotent element f . We study the simple Bershadsky-Polyakov algebra W_k at positive integer levels and obtain a classification of their irreducible modules.

In the case $k=1$, we show that this vertex algebra has a Kazama-Suzuki-type dual isomorphic to the simple affine vertex superalgebra $L_{-k'}(\mathfrak{osp}(1|2))$ for $k'=-5/4$. This is joint work with D. Adamovic.

Mercoledì 9 Febbraio 2022 - ore 14:00

Ruggero Bandiera (SAPIENZA Università di Roma)

Mappe di semiregolarità e teoria di Chern-Simons

Dopo alcuni richiami sull'approccio alla teoria delle deformazioni tramite DG algebre di Lie (o più in generale algebre L -infinito), ci concentreremo sullo studio delle deformazioni di un fascio coerente F su una varietà proiettiva complessa X : queste sono controllate dall'algebra degli endomorfismi derivati di F , ed in particolare le ostruzioni alle deformazioni di F vivono nello spazio $\text{Ext}^2(F, F)$.

In questa situazione, Buchweitz e Flenner (arXiv:math/9912245) introducono una famiglia di applicazioni lineari, dette mappe di semiregolarità, dallo spazio delle ostruzioni $\text{Ext}^2(F, F)$ a valori nella coomologia di X , e dimostrano che queste annullano una classe particolare di ostruzioni, dette ostruzioni curvilinee.

Nell'ultima parte del seminario esporremo alcuni recenti risultati ottenuti in collaborazione con M. Manetti ed E. Lepri (arXiv:2111.12985).

Usando la teoria di Chern-Simons, costruiremo modelli L-infinito delle mappe di semiregolarità di Buchweitz-Flenner, mostrando che queste sono indotte da morfismi di teorie delle deformazioni con target non ostruito, ed in particolare annullano tutte le ostruzioni alle deformazioni di F (non solo quelle curvilinee).

Mercoledì 16 Febbraio 2022 - ore 15:00

Ariyan Javanpeykar (Johannes Gutenberg-Universität)

The conjectures of Lang and Vojta

Why do some polynomial equations have only finitely many solutions in the integers? Lang-Vojta's conjecture provides a conjectural answer and relates this number-theoretic question to complex geometry.

Indeed, conjecturally, a variety has only finitely many rational points if and only if it is hyperbolic. I will start out this talk explaining the Lang-Vojta conjectures, and will then present new results on dynamical systems of hyperbolic varieties, rational points on ramified covers of abelian varieties, the fundamental group of a variety covered by many pointed curves, and rigidity results for families of canonically polarized varieties.

These results are mathematically independent, but all guided by the conjectures of Lang-Vojta.

Mercoledì 23 Febbraio 2022 - ore 14:00

Lewis Topley (University of Bath)

Dirac reduction for shifted Yangians

Finite W -algebras are a finite collection of filtered algebras associated to each complex semisimple Lie algebra, which have interesting applications to the classification of primitive ideals in enveloping algebras. One of the key challenges in the theory is to find an explicit presentation for a finite W -algebra. This problem was solved comprehensively for the general linear algebras by Brundan--Kleshchev, by relating them to shifted Yangians, with further important work by Kac--De Sole and their collaborators. Extending this to other classical Lie algebras has proved to be extremely difficult. A good approximation to the problem is describing the Poisson structure on the semiclassical limit of the W -algebra. In this seminar I will describe some new progress in extending the Yangian description to types B , C , D in the semiclassical setting, using the theory of Dirac reduction.

Mercoledì 2 Marzo 2022 - ore 14:00

Anne Moreau (Université Paris-Saclay)

Nilpotent orbits arising from admissible affine vertex algebras

In this talk, I will give a simple description of the closure of the nilpotent orbits appearing as associated varieties of admissible affine vertex algebras in terms of primitive ideals. I will also connect these varieties with the cohomology of the small quantum groups associated with an l -th root of unity. This is a joint work with Tomoyuki Arakawa and Jethro van Ekeren.

Mercoledì 2 Marzo 2022 - ore 15:00

Valdemar Tsanov (Ruhr-Universität Bochum)

Weyl chambers and Geometric Invariant Theory

Given an embedding of complex reductive Lie groups $L < G$, which irreducible finite dimensional representations of G admit L -invariant vectors? The motivation and methods for the study of this question stem from its many interpretations in various contexts, such as Geometric Invariant Theory on flag varieties, momentum maps and coadjoint orbits, Schubert calculus and combinatorics. A development started by Heckman in the 1980's and culminating with Ressayre's work in 2010 provides a description of the generalized Littlewood-Richardson cone, an object capturing the desired representations in an asymptotic sense, by a set of inequalities derived from the Hilbert-Mumford criterion. The exact implementation of these powerful qualitative results remains difficult and case dependent, prompting research for a better understanding of the relevant structures. In this talk I shall address the question: how much can one say only from the isomorphism types of the two groups? An answer is obtained by compiling all of Ressayre's inequalities into one inequality between two numerical invariants of L and G , respectively. Geometrically, this is reflected in properties of L -unstable loci and GIT-quotients of flag varieties of G . I shall also comment on properties of embeddings and the data relevant for exact calculations.

Mercoledì 9 Marzo 2022 - ore 14:00

Philippe Eyssidieux (Université Grenoble-Alpes)

Orbifold Kähler Groups related to Mapping Class groups

We prove the uniform stability of some smooth DM stacks obtained by further ramifying the moduli stack of stable curves over the Deligne-Mumford boundary divisor and apply this construction to prove that most of the complex projective surfaces proposed by Bogomolov and Katzarkov in 1997 as counter examples to the Shafarevich conjecture on holomorphic convexity do satisfy this statement. Joint work with Louis Funar. arXiv:2112.06726 [math.AG].

Mercoledì 16 Marzo 2022 - ore 14:00

Cinzia Casagrande (Università di Torino)

Varietà di Fano con difetto di Lefschetz 3

Parleremo di un risultato di struttura per alcune varietà di Fano (complesse e lisce), che dipende dal difetto di Lefschetz $\delta(X)$, un invariante di X definito nel modo seguente.

Consideriamo un divisore primo D in X e la restrizione $r: H^2(X, \mathbb{R}) \rightarrow H^2(D, \mathbb{R})$. Allora $\delta(X)$ è la massima dimensione di $\ker(r)$, al variare di D tra tutti i divisori primi di X . Se $\delta(X) > 3$, allora X è un prodotto $S \times T$, dove S è una superficie. Quando $\delta(X) = 3$, X non è necessariamente un prodotto, ma vedremo che ha comunque una struttura molto rigida ed esplicita.

Più precisamente, esiste una varietà di Fano liscia T , con $\dim T = \dim X - 2$, tale che X è ottenuta da T con due possibili costruzioni esplicite; in entrambi i casi c'è un P^2 -fibrato Z su T tale che X è il blow-up di Z lungo 3 sottovarietà lisce di codimensione 2, a due a due disgiunte.

Il teorema di struttura permette di completare la classificazione delle Fano 4-folds con difetto di Lefschetz almeno 3.

Si tratta di un lavoro in collaborazione con Eleonora Romano e Saverio Secci.

Mercoledì 23 Marzo 2022 - ore 14:00

François Charles (DMA/ENS)

Geometry of numbers in infinite rank and an arithmetic analogue of affine varieties

I will outline how to extend classical results in the theory of euclidean lattices to infinite rank.

When applied to polynomial rings, these results will allow us to describe an analogue in arithmetic geometry to the notion of affine algebraic variety. We will provide applications to the study of approximation of holomorphic functions by polynomials with integral coefficients. Joint work with Jean-Benoît Bost.

Mercoledì 6 Aprile 2022 - ore 14:00

Federico Pellarin (SAPIENZA Università di Roma)

Funzioni zeta associate a curve sui campi finiti

La dicotomia tra funzioni zeta di Dedekind e funzioni zeta parziali associate a un campo di numeri si estende formalmente a certi valori zeta in campi globali di caratteristica positiva (lavori di Anderson, Goss e altri autori).

Goss ha anche proposto una nozione di "funzione zeta" in questo contesto, ma fenomenologie tipiche della teoria analitica dei numeri, come le equazioni funzionali, sono totalmente assenti.

In questo seminario descriveremo una costruzione alternativa di "funzioni zeta parziali" rigide analitiche, definite su curve proiettive sui campi finiti. Dopo averne descritto le proprietà di base, illustreremo brevemente come queste funzioni possono essere utilizzate nella

dimostrazione recente di una congettura di Lara-Rodríguez e Thakur su certi valori zeta multipli in caratteristica positiva (lavoro in collaborazione con Kwun Chung e Tuan Ngo Duc).

Mercoledì 13 Aprile 2022 - ore 14:00

Diego Corro (Università zu Köln)

Yamabe type problems and singular Riemannian foliations

The Yamabe problem is a classical problem about how to find Riemannian metrics of constant scalar curvature. This problem can be written as a PDE with unique positive solutions. On the other hand, the problem of finding general solutions to the Yamabe PDE turns out to be a very complicated one.

Given that group actions by isometries and geometric projections are particular types of singular Riemannian foliations, in this talk we consider singular Riemannian foliations as a form of symmetry. Using this notion of symmetry together with techniques of calculus of variations, we show how to find an infinite number of general solutions to the Yamabe problem, which are constant along the leaves of the foliation.

Mercoledì 13 Aprile 2022 - ore 15:00

Alexander Lytchak (Università zu Köln)

Four dimensional Hadamard manifolds are Euclidean

I will give an overview about topology of CAT(0) manifolds and will explain why in four dimensions every such manifold is homeomorphic to the Euclidean space.

This is a joint work with Nagano-Stadler.

Mercoledì 20 Aprile 2022 - ore 14:00

Roberto Svaldi (École Polytechnique Fédérale de Lausanne)

Limitatezza di varietà di Calabi-Yau ellittiche

In questo seminario, parlerò di alcuni risultati e idee recenti nello studio della limitatezza delle varietà, in collaborazione con Di Cerbo, Birkar e Di Cerbo, e Filipazzi e Hacon.

In particolare, mi concentrerò sulle varietà che ammettono una fibrazione ellittica, con particolare attenzione al caso delle varietà di Calabi-Yau ellittiche.

In questo contesto, spiegherò anche come entra in scena la Congettura del Cono di Kawamata-Morrison.

Mercoledì 27 Aprile 2022 - ore 14:00

Ilaria Mondello (Université de Paris Est Créteil)

ANNULLATO

Mercoledì 4 Maggio 2022 - ore 14:00

Cedric Bonnafe (Université de Montpellier)

Singular K3 surfaces and complex reflection groups

Joint work with A. Sarti. Singular K3 surfaces are the K3 surfaces with maximal Picard number, namely 20. I will explain how to construct families of K3 surfaces with big Picard number using invariants of finite complex reflection groups of rank 4, each family containing some singular ones. This extends earlier work of Barth-Sarti for two reasons: firstly, we obtain much more examples by considering all reflection groups of rank 4 and, secondly, our proofs involve more theory of complex reflection groups and avoids as much as possible (but not completely) a case-by-case analysis.

Mercoledì 11 Maggio 2022 - ore 14:00

Claudio Arezzo (ICTP)

Metrische a curvatura scalare costante su varietà algebriche e rivestimenti di Galois

In questo seminario presenterò alcuni risultati recenti ottenuti con Y. Shi e A. Della Vedova. Dopo un'introduzione generale sui metodi noti per produrre metriche di Einstein e cscK, presenterò come un recente risultato fondamentale di Cheng-Chen applicato a varietà algebriche permetta di costruire infinite nuove famiglie di metriche cscK, connettendomi a varie costruzioni geometriche nel caso di rivestimenti ciclici, abeliani e non.

Mercoledì 18 Maggio 2022 - ore 14:00

Giacomo Micheli (University of South Florida)

An Equivariant Isomorphism Theorem for Arboreal Galois Representations

In this talk we first recall the notion of arboreal Galois representation and then we develop a method to effectively determine the set of primes p for which certain arboreal Galois representations are surjective modulo p .

Our method is based on a combination of height bounds on integral points on elliptic curves over function fields in positive characteristic and the ABC theorem for function fields.

Using this technique we prove Jones' conjecture on the surjectivity of the arboreal Galois representation attached to $f=x^2+t$ [Conjecture 6.7, Compositio Math. 43 (5) (2007)].

This is a recent joint work with Andrea Ferraguti.

Mercoledì 25 Maggio 2022 - ore 14:00

Giuseppe Ancona (IRMA STRasbourg)

La congettura standard di tipo Hodge per le varietà abeliane di dimensione quattro

Sia S una superficie e V il \mathbb{Q} -spazio vettoriale dei divisori su S modulo equivalenza numerica. Il prodotto d'intersezione definisce una forma quadratica non degenera su V . Grazie ai lavori di Hodge e Segre sappiamo che questa forma quadratica è di segnatura $(s_+, s_-) = (1, \dim V - 1)$.

Grothendieck ha formulato negli anni sessanta una congettura che propone una generalizzazione di questo enunciato a varietà di dimensione superiore. In caratteristica zero questa congettura è una conseguenza delle relazioni bilineari di Hodge-Riemann. In caratteristica p assai poco è noto.

Attraverso formule del prodotto classiche sulle forme quadratiche tradurremo questo problema di segnatura in un problema p -adico. Quest'ultimo può essere attaccato con la teoria di Hodge p -adica. Ciò ci permetterà di dedurre la congettura di Grothendieck per le varietà abeliane di dimensione quattro.

Mercoledì 1 Giugno 2022 - ore 14:00

Thorsten Beckmann (Universität Bonn)

Atomic sheaves on hyper-Kähler manifolds

Motivated by the study of derived categories of hyper-Kähler manifolds, we introduced last year in an ad hoc way a Mukai vector in the Mukai lattice for certain sheaves.

Guided by the curiosity of a more systematic understanding of this phenomenon, we introduced a new class of so-called atomic sheaves on hyper-Kähler manifolds.

Atomic sheaves behave in many ways like simple sheaves on K3 surfaces and we report on the ongoing journey of thoroughly understanding their properties.

Mercoledì 15 Giugno 2022 - ore 14:00

Javier Fresán (CMLS - École Polytechnique)

A non-hypergeometric E-function

In a landmark 1929 paper, Siegel introduced the class of E-functions with the goal of generalising the transcendence theorems for the values of the exponential. E-functions are power series with algebraic coefficients subject to certain growth conditions of arithmetic nature that satisfy a linear differential equation.

Besides the exponential, examples include Bessel functions and a rich family of hypergeometric series. Siegel asked whether all E-functions are polynomial expressions in these hypergeometric series.

I will explain why the answer is negative and a possible amendment to Siegel's question in the form "all E-functions come from exponential motives".

This is a joint work with P. Jossen.

Mercoledì 22 Giugno 2022 - ore 14:00

Margarida Melo (Università Roma Tre)

On the top weight rational cohomology of the moduli space of abelian varieties

In the last few years, tropical methods have been applied quite successfully in understanding the combinatorics behind compactifications of moduli spaces, in particular by endowing them with a tropical modular interpretation.

Consequently, one can study different properties of these (compactified) spaces by studying their tropical counterparts. In this talk, which is based in joint work with Madeleine Brandt, Juliette Bruce, Melody Chan, Gwyneth Moreland and Corey Wolfe, I will illustrate this phenomena for the moduli space A_g of abelian varieties of dimension g .

In particular, I will show how to apply the tropical understanding of the classical toroidal compactifications of A_g to compute, for small values of g , the top weight cohomology of A_g . We also show that our results can be used to study the stable cohomology of the Satake compactification of A_g and the cohomology of $GL_g(\mathbb{Z})$.