Andrea T. Ricolfi

Curriculum vitae

SISSA
Via Bonomea 265, Trieste
✉ *atricolfi@gmail.com*
atricolfi.github.io

Current position	Postdoc at SISSA, awarded *SISSA Mathematical Fellowship*, founded by Dipartimenti di Eccellenza
11/2017 - 10/2018	Postdoc at Max-Planck Institut für Mathematik (Bonn)
9/2013 - 10/2017	PhD in Mathematics at University of Stavanger. Thesis: *Local Donaldson–Thomas invariants and their refinements* (available at `atricolfi.github.io`), Trial Lecture title: *Symmetric obstruction theories and Joyce's perverse sheaves*. Advisors: Proff. M. Gulbrandsen, L. Halle.

Education

October 2010 - July 2012	ALGANT Master degree in Mathematics (joint degree Padova/Bordeaux). Thesis title: *Bertini's theorem on generic smoothness*. Advisor: Qing Liu.

Visits and Scolarships

2/2015 - 6/2015	Visiting PhD at Imperial College, London. PI: Prof. Richard Thomas
2015 - 2017	Four short term visits at the University of Copenhagen
June 2013	Research Scolarship at SISSA, Trieste

Grants

Stavanger	UiS Travel Grant (personal funds): the equivalent of around 5000 € per year, for 4 years
SISSA	SISSA travel grant (personal funds): 9000 € for 3 years.

Supervision

PhD student	Solomiya Mizyuk (SISSA), co-supervised with Barbara Fantechi. Expected graduation: 2024.

Research interests

I work in Algebraic Geometry, especially in (1) enumerative geometry of **moduli spaces of sheaves** (in a broad sense: motivic/refined/K-theoretic/enumerative invariants), and (2) **derived categories** of sheaves and their **semiorthogonal decompositions**. In particular, I am interested in

- Hilbert and Quot schemes, Donaldson–Thomas and stable pair invariants, virtual localisation formulae
- Moduli stacks of sheaves and of quiver representations, Joyce's d-critical loci, perfect obstruction theories
- Motivic and K-theoretic sheaf counting, Grothendieck rings, Hall algebras, shifted symplectic derived stacks
- Derived categories of sheaves, semiorthogonal decompositions, Fourier–Mukai functors, wall-crossing phenomena
- Cohomology of moduli spaces of curves, tautological relations, compactified universal Jacobians

Publications

1. *Framed sheaves on projective space and Quot schemes*, with Alberto CAZZANIGA.
   Mathematische Zeitschrift (2021). [Journal]
2. *Framed motivic Donaldson–Thomas invariants of small crepant resolutions*, with Alberto CAZZANIGA.
   To appear in Mathematische Nachrichten. DOI: 10.1002/mana.202100068. [Preprint 2020]
3. *Higher rank K-theoretic Donaldson–Thomas theory of points*, with Nadir FASOLA and Sergej MONAVARI.
   Forum Math. Sigma, Vol. 9 E15, 1–51. DOI: 10.1017/fms.2021.4 [Journal]
4. *The equivariant Atiyah class*.
   C. R. Math. Acad. Sci. Paris. Volume 359, issue 3 (2021) 257–282. [Journal]
5. *On the motive of the Quot scheme of finite quotients of a locally free sheaf*.
   Journal de Mathématiques Pures et Appliquées, Volume 144, 2020, Pages 50–68. [Journal]

6. *Virtual classes and virtual motives of Quot schemes on threefolds*.
   Advances in Mathematics, 369 (2020). DOI: https://doi.org/10.1016/j.aim.2020.107182 [Journal]
7. *The local motivic DT/PT correspondence*, with Ben Davison.
   Journal of the London Mathematical Society (2021). DOI: 10.1112/jlms.12463 [Journal]
8. *Virtual counts on Quot schemes and the higher rank local DT/PT correspondence*, with Sjoerd Beentjes.
   To appear in Mathematical Research Letters. [Preprint 2018]
9. *Pullbacks of universal Brill–Noether classes via Abel–Jacobi morphisms*, with Nicola Pagani and Jason van Zelm.
   Mathematische Nachrichten, Vol. 293, Issue 11 (2020), 2187-2207. [Journal]
10. *The Hilbert scheme of hyperelliptic Jacobians and moduli of Picard sheaves*.
    Algebra & Number Theory 14-6 (2020), 1381–1397. [Journal]
11. *Jet bundles on Gorenstein curves and applications*, with Letterio Gatto.
    Journal of Singularities, Volume 21 (2020), 50–83. [Journal]
12. *The DT/PT correspondence for smooth curves*.
    Mathematische Zeitschrift 290 (2018), no. 1-2, 699–710. [Journal]
13. *On coherent sheaves of small length on the affine plane*, with Riccardo Moschetti.
    Journal of Algebra, 516 (2018), pp. 471–489. [Journal]
14. *Local contributions to Donaldson–Thomas invariants*.
    Int. Math. Res. Not. IMRN, 2018 (2018), no. 19, 5995–6025. [Journal]
15. *The Euler characteristic of the generalized Kummer scheme of an Abelian threefold*, with Martin Gulbrandsen.
    Geometriae Dedicata, 182 (2016), Issue 1, pp. 73–79. [Journal]
16. **PhD Thesis** *Local Donaldson–Thomas invariants and their refinements*.
    ISBN: 978-82-7644-734-7 ISSN: 1890-1387 PhD thesis no. 363. Available here.

Preprints

1. *The d-critical structure on the Quot scheme of points of a Calabi–Yau 3-fold*, with Michail Savvas [Preprint 2021]
2. *On the motive of the nested Quot scheme of points on a curve*, with Sergej Monavari. [Preprint 2021]
3. *Indecomposability of derived categories in families*, with Francesco Bastianelli, Pieter Belmans and Shinnosuke Okawa. [Preprint 2020]
4. *Higher rank motivic Donaldson–Thomas invariants of $\mathbb{A}^3$ via wall-crossing, and asymptotics*, with Alberto Cazzaniga and Dimbinaina Ralaivaosaona. [Preprint 2020]
5. *Moduli spaces of semiorthogonal decompositions in families*, with Pieter Belmans and Shinnosuke Okawa. With an appendix coauthored with Wendy Lowen [Preprint 2020]

Books

1. **Introduction to Enumerative Geometry – Classical and virtual techniques**. Submitted to Springer. Lecture notes based on two PhD courses on Enumerative Geometry and Donaldson–Thomas invariants I taught at SISSA in Fall 2019 and Spring 2021. A short (but not too short) version is available on my website.

Talks at International Conferences and Workshops

February 2021	*Virtual invariants of Quot schemes on 3-folds*, Bandoleros – Campinas Algebraic Geometry Summer Meeting 2021, Campinas (Brazil)
May 2019	*Virtual classes and virtual motives of Quot schemes on 3-folds*, HMI Workshop on Gauge theory and virtual invariants (Dublin)
December 2018	*A higher rank local DT/PT correspondence*, Workshop in Algebraic Geometry (Milan)

November 2018	*A component of the Hilbert scheme of hyperelliptic Jacobians*, Algebraic Geometry and Foliations (Conference in honor of Israel Vainsencher), Belo Horizonte (Brazil)
May 2018	*A motivic wall-crossing formula for sheaves on 3-folds*, Motives of Calabi–Yau manifolds, Kraków
October 2017	*The DT/PT correspondence for smooth curves*, A Fall Meeting in Algebraic Geometry, Turin
February 2015	*Partitions and generalized Kummer varieties*, Workshop on refined invariants (Warwick)
June 2014	*Motivic Donaldson–Thomas Invariants*, SISSA, GAeL XXII (Trieste)

Selected Talks

March 2021	*Refinements of higher rank DT invariants*, KIAS Seoul (remote)
February 2021	*Higher rank motivic DT invariants*, SISSA Trieste (remote)
October 2020	*Higher rank K-theoretic Donaldson–Thomas theory of points*, Kansas University (remote)
October 2020	*Higher rank K-theoretic Donaldson–Thomas theory of points*, Bologna
September 2020	*A moduli space of semiorthogonal decompositions*, Rutgers New Jersey (remote)
April 2020	*Higher rank K-theoretic Donaldson–Thomas theory of points*, UCSD San Diego (remote)
November 2019	*Moduli of semiorthogonal decompositions*, Stavanger
November 2019	*A motivic DT/PT correspondence via Quot schemes*, Oxford
May 2019	*Virtual invariants of Quot schemes on 3-folds*, Copenhagen
April 2019	*A component of the Hilbert scheme of hyperelliptic Jacobians*, Rome
October 2018	*Le schéma de Hilbert d'une Jacobienne hyperelliptique*, Nancy
March 2018	*Motivic local DT invariants*, IMPAN (Kraków)
January 2018	*The DT/PT correspondence for smooth curves*, University of Edinburgh
December 2018	*Curve counting via Quot schemes*, Utrecht University
November 2017	*The DT/PT correspondence for smooth curves*, KTH (Stockholm)
November 2016	*Local contributions to DT invariants*, National Algebra Meeting, Oslo
February 2016	*Counting rational curves on toric threefolds*, Copenhagen
December 2015	*Families of Abel–Jacobi curves*, Turin (Italy)
November 2015	*Critical loci and their virtual motives*, National Algebra Meeting, Oslo
October 2015	*Curve counting on threefolds*, Bergen (Norway)
April 2015	*Introduction to Motivic Integration*, Imperial College (London)
March 2015	*Refined curve counting on Calabi–Yau threefolds*, KU Leuven
February 2015	*Localisation in Donaldson–Thomas theory*, UCL (London)
December 2014	*A Hamilton's Principle in Algebraic Geometry*, Turin (Italy)
June 2014	*Curve Counting and Box Counting*, Turin (Italy)
February 2014	*Curve Counting Invariants and Euler Characteristics*, Bergen (Norway)
November 2013	*Limits of Special Weierstrass Points*, National Algebra Meeting, Oslo

Selected Schools and Workshops

February 2019	Winter School on Enumerative Geometry and Modular Forms (Frankfurt)
April 2018	Curves, Sheaves and Moduli (Stavanger)
February 2018	Workshop on Complex Algebraic Geometry – Pirola 60th (Barcellona)
January 2018	Enumerative Geometry Beyond Numbers (MSRI, Berkeley)
September 2017	Modern Moduli Theory (Oxford)
September 2017	British Algebraic Geometry (Cambridge)
August 2017	Abel Symposium (Svolvær)
June 2016	Stability conditions on triangulated categories and applications (Nordfjordeied)
April 2016	Varieties of Calabi–Yau type (Warsaw)
September 2015	Derived Categories and Moduli Spaces (Stavanger)
July 2015	PRAGMATIC Summer school on Moduli of curves and line bundles (Catania)
June 2015	GAeL 2015 (Leuven)
February 2015	Motivic invariants related to K3 and Abelian geometries (Berlin)
September 2014	Modern trends in Gromov–Witten theory (Hannover)
June 2014	GAeL 2014 (Trieste)

June 2014	Toric degenerations and Mirror Symmetry (Nordfjordeied)

Teaching

Spring 2021	*Localisation in Enumerative Geometry*; PhD Course (SISSA Trieste)
Fall 2019	*Techniques in Enumerative Geometry*; PhD Course (SISSA, Trieste)
Spring 2017	*Algebraic Geometry* MAT630 (University of Stavanger)
Spring 2016	Teaching assistant for *Mathematical Methods 2* MAT200 (University of Stavanger)
Fall 2015	Teaching assistant for *Linear Algebra* MAT110 (University of Stavanger)
Fall 2014	*Discrete Mathematics* MAT120 (University of Stavanger)
Spring 2013	Teaching assistant for *Geometria e Algebra Lineare* (Politecnico di Torino)

PhD courses attended

2013 - 2014	Deformation Theory (following Sernesi's *Deformations of algebraic schemes*)
2016	Mirror Symmetry (reading course on *Mirror Symmetry and Algebraic Geometry* by Cox–Katz)

Organisation of events and other tasks

	Been referee for 7 high level international journals
Fall 2020 -	Co-organiser of the Algebraic Geometry seminar SISSA-University of Trieste
Fall 2020 -	Co-organiser of the Algebraic Geometry seminar in SISSA/IGAP
2019 - 2020	Postdoc representative for the Mathematics area at SISSA, Trieste
2019 - 2020	Co-organiser of the Algebraic Geometry seminar joint between SISSA and ICTP
September 2015	Local organiser of the Workshop: Derived Categories and Moduli Spaces (Stavanger)