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Assistant Professor (rtd-B) at SISSA, Trieste
Geometry and Mathematical Physics
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EMPLOYMENT HISTORY & EDUCATION

Assistant Professor (rtd-B) at Università di Bologna 9/2021-6/2022
Postdoc at SISSA, Trieste (*SISSA Mathematical Fellowship*) 11/2018-9/2021
Postdoc at Max-Planck Institut für Mathematik, Bonn 11/2017-10/2018
PhD in Mathematics at University of Stavanger (UiS Norway) 9/2013-10/2017
Thesis: *Local Donaldson–Thomas invariants and their refinements*
ISBN: 978-82-7644-734-7 ISSN: 1890-1387 PhD thesis no. 363. Available here
Trial Lecture: *Symmetric obstruction theories and Joyce's perverse sheaves*
Advisors: Proff. Martin Gulbrandsen, Lars Halle
M.S. in Mathematics (ALGANT Program: Università di Padova & Université Bordeaux 1) 10/2010-7/2012
Thesis: *Bertini's theorem on generic smoothness.* Advisor: Prof. Qing Liu

VISITS AND SCOLARSHIPS

Imperial College London Visiting PhD (P.I. Prof. Richard Thomas) 2/2015-6/2015
University of Copenhagen 4 short term visits (P.I. Prof. Lars Halle) 2015-17
SISSA:
- Dipartimenti di Eccellenza travel grant (as a postdoc): 9000€ 2018-21
- One month Research Scolarship 6/2013

Stavanger: UiS PhD Travel Grant: the equivalent of around 5000€ per year 2013-17

RESEARCH INTERESTS

• Enumerative geometry of *moduli spaces of sheaves* (in a broad sense: motivic/refined/K-theoretic/enumerative invariants) • Hilbert and Quot schemes, Donaldson–Thomas invariants, virtual classes, virtual localisation • Moduli stacks of sheaves and of quiver representations, Joyce's d-critical loci • Grothendieck rings of varieties, Hall algebras • Cohomology of moduli spaces of curves, tautological relations, compactified universal Jacobians

SUPERVISION

Past PhD students:
- Michele Graffeo (SISSA). Co-supervised with Prof. Ugo Bruzzo.
  PhD thesis: Zero-dimensional sheaves, group actions and blowups. 25/11/2022

Current PhD students:
- Solomiya Mizyuk (SISSA), co-supervised with Prof. Barbara Fantechi.
- Ajay Gautam (SISSA), co-supervised with Prof. Barbara Fantechi.
- Elisa Vitale (SISSA), co-supervised with Prof. Barbara Fantechi.

PUBLICATIONS

Articles

1. *On the Behrend function and the blowup of some fat points*, with M. GRAFFEO.
   Advances in Mathematics, Volume 415, 15 February 2023, 108896. [Journal]
2. *Hilbert squares of degeneracy loci*, with E. FATIGHENTI, F. MEAZZINI, G. MONGARDI.
   Rendiconti del Circolo Matematico di Palermo Series 2. (2022) [Journal]
3. *On the motive of the nested Quot scheme of points on a curve*, with S. MONAVARI.
   Journal of Algebra, Vol. 610, 15 November 2022, Pages 99–118 [Journal]
4. *Higher rank motivic Donaldson–Thomas invariants of $\mathbb{A}^3$ via wall-crossing, and asymptotics*, with A. CAZZANIGA and D. RALAIVAOSAONA.
   Mathematical Proceedings of the Cambridge Philosophical Society, Volume 174, Issue 1, January 2023, pp. 97–122. [Journal]
5. *Sur la lissité du schéma Quot ponctuel emboîté*, with S. MONAVARI (in French).
   Canadian Mathematical Bulletin, Volume 66 , Issue 1, March 2023 , pp. 178–184 [Journal]
6. *Framed sheaves on projective space and Quot schemes*, with A. CAZZANIGA.
   Mathematische Zeitschrift, 300, 745–760 (2022). [Journal]
7. *Framed motivic Donaldson–Thomas invariants of small crepant resolutions*, with A. CAZZANIGA.
   Mathematische Nachrichten, Vol. 295, Issue 6 (2022), 1096–1112. [Journal]
8. *Higher rank K-theoretic Donaldson–Thomas theory of points*, with N. FASOLA and S. MONAVARI.
   Forum Math. Sigma, Vol. 9, 2021, E15, 1–51. [Journal]
9. *The equivariant Atiyah class.*
   C. R. Math. Acad. Sci. Paris. Volume 359, Issue 3 (2021) 257–282. [Journal]

10. *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]
11. *Virtual classes and virtual motives of Quot schemes on threefolds.*
Advances in Mathematics, 369 (2020) 107182. [Journal]
12. *The local motivic DT/PT correspondence*, with B. DAVISON.
Journal of the London Mathematical Society, Vol. 104, Issue 3 (2021), 1384–1432. [Journal]
13. *Virtual counts on Quot schemes and the higher rank local DT/PT correspondence*, with S. BEENTJES.
Math. Res. Lett., Vol. 28, no. 4 (2021), 967–1032. [Journal]
14. *Pullbacks of universal Brill–Noether classes via Abel–Jacobi morphisms*, with N. PAGANI and J. VAN ZELM.
Mathematische Nachrichten, Vol. 293, Issue 11 (2020), 2187-2207. [Journal]
15. *The Hilbert scheme of hyperelliptic Jacobians and moduli of Picard sheaves.*
Algebra & Number Theory 14-6 (2020), 1381–1397. [Journal]
16. *Jet bundles on Gorenstein curves and applications*, with L. GATTO.
Journal of Singularities, Volume 21 (2020), 50–83. [Journal]
17. *The DT/PT correspondence for smooth curves.*
Mathematische Zeitschrift 290 (2018), no. 1-2, 699–710. [Journal]
18. *On coherent sheaves of small length on the affine plane*, with R. MOSCHETTI.
Journal of Algebra, 516 (2018), pp. 471–489. [Journal]
19. *Local contributions to Donaldson–Thomas invariants.*
Int. Math. Res. Not. IMRN, 2018 (2018), no. 19, 5995–6025. [Journal]
20. *The Euler characteristic of the generalized Kummer scheme of an Abelian threefold*, with M. GULBRANDSEN.
Geometriae Dedicata, 182 (2016), Issue 1, pp. 73–79. [Journal]

Preprints

1. *A sign that used to annoy me, and still does.* [2023]
2. *Motivic classes of noncommutative Quot schemes.* [2023]
3. *The d-critical structure on the Quot scheme of points of a Calabi–Yau 3-fold*, with M. SAVVAS [2021]
4. *Indecomposability of derived categories in families*, with F. BASTIANELLI, P. BELMANS and S. OKAWA. [2020]
5. *Moduli spaces of semiorthogonal decompositions in families*, with P. BELMANS and S. OKAWA. With an appendix coauthored with W. LOWEN. [2020]

Books

1. *An invitation to modern enumerative geometry*
Springer, SISSA lecture series, Vol. 3.
DOI: `https://doi.org/10.1007/978-3-031-11499-1` 12/2022

TALKS AT INTERNATIONAL CONFERENCES AND WORKSHOPS

- *Higher rank K-theoreric Donaldson–Thomas theory*
IV Congresso Brasileiro de Jovens Pesquisadores em Matemática pura, aplicada e estatística (João Pessoa, Brazil) 10/2022
- *A tale of two d-critical structures*
Young Researchers Meeting in Algebra and Geometry 2022 (SISSA, Trieste) 9/2022
- *A tale of two d-critical structures*
Bandoleros 2022 (Ankara, Turkey + remote) 5/2022
- *A motivic wall-crossing formula*
Grothendieck ring and Derived category: a gathering (Turin) 4/2022
- *Virtual invariants of Quot schemes on 3-folds*
Bandoleros 2021 – Campinas Algebraic Geometry Summer Meeting 2021 (remote) 2/2021
- *Virtual classes and virtual motives of Quot schemes on 3-folds*
HMI Workshop on Gauge theory and virtual invariants (Dublin) 5/2019
- *A higher rank local DT/PT correspondence*
Workshop in Algebraic Geometry (Milan) 12/2018
- *A component of the Hilbert scheme of hyperelliptic Jacobians*
Algebraic Geometry and Foliations: in celebration of Israel Vainsencher's 70th Birthday, (Belo Horizonte, Brazil) 11/2018
- *A motivic wall-crossing formula for sheaves on* 3*-folds*
Motives of Calabi–Yau manifolds (Kraków) 5/2018
- *Motivic local DT invariants*
IMPAN (Kraków) 3/2018
- *The DT/PT correspondence for smooth curves*
A Fall Meeting in Algebraic Geometry and related topics (Turin) 10/2017
- *Local contributions to DT invariants*
National Algebra Meeting (Oslo) 11/2016
- *Critical loci and their virtual motives*
National Algebra Meeting (Oslo) 11/2015
- *Partitions and generalized Kummer varieties*
Moduli Spaces and Derived Categories (Warwick) 2/2015

- *Motivic Donaldson–Thomas Invariants*
  GAeL XXII (SISSA, Trieste) 6/2014
- *Limits of Special Weierstrass Points*
  National Algebra Meeting (Oslo) 11/2013

SELECTED SEMINAR TALKS

- *Geometry of Hilbert schemes, and the two numbers* $+1, -1$ (Politecnico di Milano) 4/2023
- *Quot schemes and their d-critical structure(s)* (Firenze) 3/2023
- *Enumerative invariants of Quot schemes and their virtual refinements* (ICTP) 2/2023
- *Quot schemes and their d-critical structure(s)* (Pisa) 11/2022
- *Quot schemes and their d-critical structure(s)* (Bonn) 11/2022
- *K-theoretic sheaf counting* (Genova) 5/2022
- *A motivic DT/PT correspondence* (Lausanne) 5/2022
- *Refined invariants of moduli spaces* (Mathematical Colloquium, João Pessoa, Brazil) 4/2022
- *Refined sheaf counting* (Trento) 2/2022
- *Sheaf counting and Quot schemes* (Milano) 11/2021
- *d-critical structure(s) on the Quot scheme of points on a 3-fold* (CMSA Harvard University) 10/2021
- *The d-critical structure on the Quot scheme of points on a 3-fold* (SISSA, Trieste) 5/2021
- *Refinements of higher rank DT invariants* (KIAS Seoul, remote) 3/2021
- *Higher rank motivic DT invariants* (SISSA, Trieste) 2/2021
- *Higher rank K-theoretic Donaldson–Thomas theory of points* (Kansas University, remote) 10/2020
- *Higher rank K-theoretic Donaldson–Thomas theory of points* (Bologna) 10/2020
- *A moduli space of semiorthogonal decompositions* (Rutgers New Jersey, remote) 9/2020
- *Higher rank K-theoretic Donaldson–Thomas theory of points* (UCSD San Diego, remote) 4/2020
- *Moduli of semiorthogonal decompositions* (Stavanger) 11/2019
- *A motivic DT/PT correspondence via Quot schemes* (Oxford) 11/2019
- *Virtual invariants of Quot schemes on 3-folds* (Copenhagen) 5/2019
- *A component of the Hilbert scheme of hyperelliptic Jacobians* (Rome) 4/2019
- *Le schéma de Hilbert d'une Jacobienne hypérelliptique* (Nancy) 10/2018
- *The DT/PT correspondence for smooth curves* (University of Edinburgh) 1/2018
- *Curve counting via Quot schemes* (Utrecht University) 12/2018
- *The DT/PT correspondence for smooth curves* (KTH, Stockholm) 11/2017
- *Counting rational curves on toric threefolds* (Copenhagen) 2/2016
- *Families of Abel–Jacobi curves* (Turin, Italy) 12/2015
- *Curve counting on threefolds* (Bergen, Norway) 10/2015
- *Introduction to Motivic Integration* (Imperial College London) 4/2015
- *Refined curve counting on Calabi–Yau threefolds* (KU Leuven) 3/2015
- *Localisation in Donaldson–Thomas theory* (UCL, London) 2/2015
- *A Hamilton's Principle in Algebraic Geometry* (Turin, Italy) 12/2014
- *Curve Counting and Box Counting* (Turin, Italy) 6/2014
- *Curve Counting Invariants and Euler Characteristics* (Bergen, Norway) 2/2014

SELECTED SCHOOLS AND WORKSHOPS

- Japanese-European Symposium on Symplectic Varieties and Moduli Spaces (Bologna–Tokyo) 3/2022
- Ricercatori in Algebra e Geometria (Pisa) 9/2021
- Enumerative Geometry, Physics and Representation Theory (IHES, Paris) 7/2021
- Winter School on Enumerative Geometry and Modular Forms (Frankfurt) 2/2019
- Curves, Sheaves and Moduli (Stavanger) 4/2018
- Workshop on Complex Algebraic Geometry – Pirola 60th (Barcellona) 2/2018
- Enumerative Geometry Beyond Numbers (MSRI, Berkeley) 1/2018
- Modern Moduli Theory (Oxford) 9/2017
- British Algebraic Geometry (Cambridge) 9/2017
- Abel Symposium (Svolvær) 8/2017
- Stability conditions on triangulated categories and applications (Nordfjordeied) 6/2016
- Varieties of Calabi–Yau type (Warsaw) 4/2016
- Derived Categories and Moduli Spaces (Stavanger) 9/2015
- PRAGMATIC Summer school on Moduli of curves and line bundles (Catania) 7/2015
- GAeL 2015 (Leuven) 6/2015
- Motivic invariants related to K3 and Abelian geometries (Berlin) 2/2015
- Modern trends in Gromov–Witten theory (Hannover) 9/2014
- GAeL 2014 (Trieste) 6/2014
- Toric degenerations and Mirror Symmetry (Nordfjordeied) 6/2014

TEACHING

- Algebraic Geometry (2^{nd} Year Master Università di Trieste and SISSA PhD) Fall 2022
- *Geometria e Algebra T*; Bachelor Course (60 hours – Ingegneria Chimica e Biochimica, Bologna) Fall 2021
- *Localisation in Enumerative Geometry*; PhD Course (20 hours – SISSA, Trieste) Spring 2021
- *Techniques in Enumerative Geometry*; PhD Course (20 hours – SISSA, Trieste) Fall 2019
- *Algebraic Geometry* MAT630 (Master course, University of Stavanger) Spring 2017
- T.A. for *Mathematical Methods 2* MAT200 (Bachelor, University of Stavanger) Spring 2016

- T.A. for *Linear Algebra* MAT110 (Bachelor, University of Stavanger) Fall 2015
- *Discrete Mathematics* MAT120 (Bachelor, University of Stavanger) Fall 2014
- T.A. for *Geometria e Algebra Lineare* (Politecnico di Torino) Spring 2013

GRADUATION COMMITTEES

I was part of the board examining the following theses.

Master degree

- Luca Fiorindo (Università di Trieste) 20/7/2022

PhD degree

- Blessing Oni (ICTP & SISSA) 12/12/2022

CONFERENCE ORGANISATION

- Quiver Representations, Quiver Varieties and Combinatorics (Università di Bologna) 22–26 May 2023
- *Refined invariants in moduli theory* (SISSA and Università di Trieste) 2–5 May 2023.
- *Moduli spaces: theory and coding* (Les Diablerets) 27/2 – 3/3 2023
- Local organiser of the Workshop *Derived Categories and Moduli Spaces* (Stavanger) 9/2015

SEMINAR ORGANISATION AND OTHER TASKS

- Board member for the admission to the SISSA PhD program in Geometry and Math. Physics 2/2023
- Member of *Collegio di Dottorato*, SISSA, Trieste 7/2022-
- Co-organiser of *TRINO*, aka *Triplice Seminario Triestino* 2022-
- Co-organiser of the Algebraic Geometry seminar SISSA-University of Trieste 2022-23
- Co-organiser of the Algebraic Geometry seminar SISSA-University of Trieste 2020-21
- Co-organiser of the Algebraic Geometry seminar in SISSA/IGAP 2020-21
- Co-organiser of the Algebraic Geometry seminar joint between SISSA and ICTP 2019-20
- Postdoc representative for the Mathematics area at SISSA, Trieste 2019-20
- Been referee for >10 high level international journals