Curriculm Vitae

Contact Details

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Research Interests

Machine learning, deep learning, focusing on their applications in life sciences. I am particularly interested in applications of large transformers in various domains, and in studying the geometry of data representations arising from deep learning.

Current Position

2022– **Permanent Researcher** , *AREA Science Park, Trieste, IT*.

Professional Experience

2020–2022 **Postdoctoral Researcher**, *AREA Science Park, Trieste, IT*.

2019–2020 **Postdoctoral Researcher**, *CNR, Istituto Officina dei Materiali, Trieste, IT*.

2017–2018 **Claude Leon Postdoctoral Fellow**, *AIMS and Stellenbosch University, SA*.

2016 **Postdoctoral researcher**, *AIMS, Cape Town, SA*.

2015 **Stipendiary Lecturer**, *Hertford College, University of Oxford, UK*.

Education

2019-2020 **Master in High Performance Computing**, *SISSA and ICTP, Trieste*.
Thesis title: Representation learning and hierarchical clustering for microscopy images.
Supervisors: Dr. Stefano Cozzini, Dr. Alessio Ansuini.

2011–2015	**DPhil in Mathematics, Algebraic Geometry**, *University of Oxford, Lincoln College.*
	Thesis title: On some computations of refined Donaldson-Thomas invariants.
	Supervisor: Prof. Balazs Szendrői.

2010–2011	**MRI Masterclass in Moduli Spaces**, *Utrecht University.*
2008–2010	**Msc in Mathematics**, *Universita' degli Studi di Milano.*
2005–2008	**Bsc in Matematica**, *Universita' degli Studi di Milano-Bicocca.*

Prizes and Fellowships

2020	**Best Thesis Prize**, *travel grant.*
	Master in High Performance Computing (SISSA-ICTP), Italy
2017–2018	**Claude Leon Award**, *Postdoctoral grant and travel grant.*
	Claude Leon Foundation, Stellenbosch University, SA
2011–2015	**EPSRC Grant within MICA**, *Fully funded fellowship.*
	EPSRC, University of Oxford, UK
2011–2015	**Mathematical Research Institute (MRI) Grant**, *Fully funded fellowship.*
	MRI, Utrecht University, NL

Publications

Google Scholar

ORCID: 0000-0001-6271-3303

Responsability roles

2024-2025	*Responsible of Operative Unit and Substitute PI (AREA Science Park)*, PRIN PNRR: Machine learning algorithms for single-cell genomics from long-reads sequencing. Budget (€): 110K OU (250K total).
2023-2026	*Work Package Leader for PNRR Project PRPCeric*, WP11 FAIR data approaches and advanced management services Budget (€): 2.2M WP11 (41M total).
2023-2026	*Responsible of Operative Unit (AREA Science Park)*, FVG Regional Project Support for the diagnosis of rare diseases through Artificial Intelligence. Budget (€): 1.1M OU (3.4M total).

Supervision

PhD Thesis Supervision

2023-2026	*Supervisor, joint with A. Ansuini and G. Caravagna*, of L. Valeriani at UniTS (Applied Data Science & Artificial Intelligence). Lucrezia is currently studying statistical methods for long-reads sequencing.
2023-2026	*Supervisor, joint with A. Ansuini and S. Cozzini*, of T. Rodani at UniTS (Applied Data Science & Artificial Intelligence). Tommaso is currently studying deep learning methods to detect and remove defects from Scanning Tunnelling Microscope images.

2022-2025	*Supervisor, joint with A. Ansuini*, of F. Barone at UniTS (Applied Data Science & Artificial Intelligence). Federico is currently studying unsupervised learning methods for protein family classification.

Msc Thesis Supervision

2022	*Supervisor, joint with A. Ansuini*, of L. Valeriani at UniTS (Data Science and Scientific Computing). Lucrezia is a PhD student at UniTS funded by AREA Science Park.
2021	*Co-supervisor, joint with A. Lerario*, of A. Rosana at UniTS and SISSA (Mathematics). Andrea is a PhD student at SISSA (Trieste, IT).
2018	*Supervisor, joint with B. Szendröi*, of J. M. Menjanahary at AIMS-SA (Mathematics). Jean Michel has a Marie Sklodowska-Curie PhD scholarship at Vilnius University (LT).
2018	*Supervisor, joint with D. Martinelli*, of M. Ratsisetraina Ravelonanosy at AIMS-SA (Mathematics). Mahefa is a PhD student at TU Eindhoven (NL).
2017	*Supervisor, joint with Prof. B. Szendröi*, of A. Ramanantoanina at AIMS-SA (Mathematics). Mahenina has a Marie Sklodowska-Curie PhD scholarship at USI (Lugano, CH).
2016	*Supervisor, with Prof. B. Szendröi*, of S. Kadedesya ad AIMS-SA (Mathematics). Stephen is a Lecturer at Busitema University (UG).
2016	*Supervisor, joint with Prof. B. Szendröi*, of H. Ravelomanantsoa Andriantsilavo at AIMS-SA (Mathematics). Heritiana is a teacher at an international school in Antananarivo (MG).

Talks and Conferences (selected)

July 2023	What is the probability that a symmetric tensor is close to rank-one?, *Joint Geometry and Probability seminar*, University of Pavia, IT.
July 2023	On the geometry of large transformers representations, *Workshop "Applications of Topological Data Analysis in Cosmology and Beyond"*, ICTP, IT.
November 2022	The geometry of hidden representations of protein language models and Adversarial Attacks on Protein Language Models (posters), *NIPS, Workshop MLSB*, New Orleans, US.
September 2022	The impact of remote homology on deep learning models for protein structure predictions (poster), *EMBO Workshop "When predictions meet experiments: the future of structure determination"*, Palermo, IT.
March 2021	Representation learning and hierarchical clustering for microscopy images, *"MHPC Day"*, SISSA-ICTP, IT.
August 2018	On some computations of refined DT-invariants, *"Nairobi Workshop in Algebraic Geometry")*, University of Nairobi, KE.
December 2017	Motivic Donaldson-Thomas invariants of (some) noncommutative threefolds, *"Counting Problems in Quantum Field Theories and String Theory"*, WITS Rural Facility, Kruger Park, SA.
May 2016	Higher rank refined DT-invariants and invariants of surfaces, *"Giornate di Geometria Algebrica e Argomenti Correlati"*, Catania, IT.
Gennaio 2015	Towards an example of DT-Nekrasov correspondence, *MICA Workshop*, University of Oxford, UK.

Luglio 2014	Higher rank phenomena in (refined) DT theory, *"Workshop on instanton counting, moduli spaces and integrable systems"*, Lorenz Center, Leiden, NL.

Teaching

Fall 2023	Natural language modeling: deep learning methods (32 hours), *Master in Data Science and Scientific Computing, UniTS, IT*.
April 2023	Introduction to representation learning and generative models (10 hours), *Master in High-Performance Computing HPC, SISSA & ICTP, IT*.
May 2022	Introduction to representation learning and generative models (10 hours), *Master in High-Performance Computing HPC, SISSA & ICTP, IT*.
August 2018	Elliptic curves, "Nairobi Pre-Workshop in Algebraic Geometry" (introductory lecture and exercise session), *University of Nairobi, KE*.
March 2017	Moduli spaces of quiver representations (3 lectures), *AIMS, SA*.
2016	Teaching assistant and tutor for several courses of the Master in Pure and Applied Mathematics, *AIMS, SA*.
2015	Tutor for Geometry I, Algebra I, Analysis I, and Algebra II, *Hertford e Lincoln College, University of Oxford, UK*.
2012-2015	Teaching assistant for Algebraic geometry, Algebraic curves (two editions). Tutor for Geometry of Surfaces (two editions), Algebraic curves, *Andrew Wiles Mathematical Institute, University of Oxford, UK*.

Other activities and Outreach

2016-today	Reviewer for several Scientific Journals and Workshops/Conferences.
2023	Introduction to chatGPT, Ai2S and Synapser Student Society, UniTS.
2021-2022	Organisation of the IncontrinRETe seminar series, AREA Science Park, Trieste, IT.
August 2018	Co-organiser PhD School in Algebraic Geometry, University of Nairobi, KE.
2017	Scientific Facilitator at National Science Week 2017, Khayelitsha, Cape Town, SA.
December 2015	Member of admission committee Herford College, University of Oxford.
December 2013	Member of admission committee St. Peter's College,University of Oxford.