

Sabino Di Trani

EDUCATION

- **High School Degree - Liceo Scientifico Enrico Fermi - Canosa di Puglia (July 2008)** Evaluation: 100/100
- **Bachelor Degree - Università di Pisa (July 2012)** Title of dissertation: *Formule di Weyl e Kostant per i Caratteri delle Algebre di Lie Semisemplici Complesse* (Weyl and Kostant's Formulas for Characters of Complex Lie Algebras). Evaluation: 104/110. Advisor: professor Giovanni Gaiffi (Università di Pisa).
- **Master Degree - Università di Pisa (July 2016)** Title of dissertation: *Ideali Abeliani di Sottoalgebre di Borel di Algebre di Lie Semplici Complesse* (Abelian Ideals of Borel Subalgebras of Complex Simple Lie Algebras). Evaluation: 110/110 cum Laude. Advisor: professor Andrea Maffei (Università di Pisa).
- **PhD - Università di Firenze (March 2020)** Title of dissertation: *Reeder's Conjecture for Lie algebras of type C*. Advisor: professor Paolo Papi (La Sapienza - Università di Roma).
- **Post Doc Position - Sapienza - Università di Roma (March 2021 - February 2022)**
- **November 2021** Winner of a grant at Sapienza - Università di Roma with the Project "Algebraic and geometric aspects of Coinvariants in the Exterior Algebra".
- **Post Doc Position - Università di Trento (March 2022 - Nowadays)**

ACTUAL POSITION

Post Doc position at Università di Trento.

SCIENTIFIC INTERESTS

I am interested in Representation Theory, Lie Theory in all their aspects and applications. During my doctoral studies I focused on the structure of the exterior algebra $\Lambda \mathfrak{g}$ as \mathfrak{g} -representation. More precisely I studied the irreducible representations appearing in $\Lambda \mathfrak{g}$ and their graded multiplicities, using combinatorial tools, branching rules and techniques to determine tensor product decomposition of irreducible representations.

SEMINARS AND TALKS AT CONFERENCES

- **19/10/2017 - Yearly PhD Seminar - Florence** Some remarkable weights on the spectrum of $\Lambda \mathfrak{sp}_{2n} \mathbb{C}$.
- **15/10/2018 - Yearly PhD Seminar - Florence** Some conjectures about the exterior algebra $\Lambda \mathfrak{g}$.
- **06/02/2019 - BAD (Borsisti, Assegnisti, Dottorandi) Seminars - Bologna** Some conjectures about the exterior algebra $\Lambda \mathfrak{g}$.
- **03/10/2019 - Yearly PhD Seminar - Florence** The Reeder's Conjecture for Lie Algebras of type C .
- **23/10/2019 - Algebra Seminars - Florence** A Reeder's Conjecture about small representations in the Exterior Algebra $\Lambda \mathfrak{g}$.
- **26/02/2020 - Conference "Geometry, Algebra and Combinatorics of Moduli Spaces and Configurations IV" - Dobbiaco** The Reeder's Conjecture for Lie Algebras of type C .
- **12/06/2020 - On Line "Algebra and Representation Theory Seminars in Tor Vergata" -Rome** The Reeder's Conjecture for Classical Lie Algebras
- **24/11/2020 -Universität zu Köln On Line Algebra Seminars** Graded Multiplicities of Small Representations in the Exterior Algebra $\Lambda \mathfrak{g}$
- **14/01/2021 -On Line Seminars "Al@Bicocche a domicilio", Università Milano Bicocca** Combinatorics of Exterior Algebra, Graded Multiplicities and Generalized Exponents of Small Representations
- **06/07/2021 - Conference "Algebraic Combinatorics of the Symmetric Groups and Coxeter Groups"- Cetraro** Small Representations in the Exterior Algebra and Generalized Exponents.
- **26/05/2022 - "First UMI meeting of Ph.D. students" (Celebration of the 100 years of UMI and 800 years of University of Padova) - Padova** Exterior Algebra: New and Old Results, Open Problems and Generalizations

PUBLICATIONS

- J. D'Aurizio, S. Di Trani, **Surprising identities for the hypergeometric $4F3$ function.** Boll Unione Mat Ital 11, 403–409 (2018). <https://doi.org/10.1007/s40574-017-0142-0>
- S. Di Trani, **”On Reeder’s Conjecture for Type B and C Lie Algebras.”** Algebras and Representation Theory (2020). <https://doi.org/10.1007/s10468-020-10009-7>
- S. Di Trani **”Reeder’s Conjecture for Even Orthogonal Algebras.”** Algebras and Representation Theory (2022). <https://doi.org/10.1007/s10468-022-10115-8>

PREPRINTS

- L. Caputi, C. Collari, S. Di Trani **”Multipath cohomology of directed graphs.”** <https://arxiv.org/abs/2108.02690>
- L. Caputi, C. Collari, S. Di Trani **”Combinatorial and Topological Aspects of Multipath Cohomology of Digraphs.”** (Minor Revisions Needed) <https://arxiv.org/abs/2110.11206>

TEACHING EXPERIENCE

- **Teaching Support for the course ”Geometria e Algebra Lineare” (Linear Algebra and Geometry)** , Faculty of Engineering , Università di Pisa, 20 hours, a.y. 2017-2018
- **Teaching Support for the course ”Geometria e Algebra Lineare” (Linear Algebra and Geometry)** , Faculty of Engineering , 30 hours, Università di Pisa, a.y. 2018-2019.
- **Teaching Activity ”Recupero debiti Formativi - Matematica” (Basic Mathematics for first year students)** , Faculty of Pharmacy, 30 hours, Università di Pisa, a.y. 2019-2020.
- **Teaching Activity ”Recupero debiti Formativi - Matematica” (Basic Mathematics for first year students)** , Faculty of Pharmacy, 30 hours, Università di Pisa, a.y. 2020-2021.

From January 2019 I am **”Cultore della Materia” (Teaching Assistant)** in **”Linear Algebra”** at the University of Pisa.

CONFERENCE ATTENDANCE

- **Jan 2016** Winter School *EACA International School on Computer Algebra and its Applications*, Seville
- **Feb 2016** *Arrangements: topology, combinatorics and stability*, Pisa
- **Apr 2016** *Quarto incontro di Combinatoria dei Sistemi di Radici* (Fourth workshop about Root System’s Combinatorics), Cortona
- **Sept 2016** *Pisa-Hokkaido Summer School on Mathematics and Its Applications*, Pisa.
- **Sept 2016** Mini school/workshop *Perspectives on arrangements and configuration spaces*, Pisa.
- **Feb 2017** Winter School *Geometry, Algebra and Combinatorics of Moduli Spaces and Configurations*, Dobbiaco
- **Apr 2017** *AAA Algebraic Algorithms and Applications - An historic overview from 1965 to 2025, at the occasion of the 65th birthday of Patrizia Gianni*, Pisa.
- **May 2017** *V incontro sulla combinatoria dei sistemi di radici* (Fifth workshop about Root System’s Combinatorics), Cortona.
- **Jun 2017** *Perspectives in algebraic topology, a day in honor of Mario Salvetti on the occasion of his 60th birthday*, Pisa
- **Jun 2017** *Arrangements and beyond: combinatorics, geometry, topology and applications*, Pisa
- **Sept 2017** *Symmetric Spaces and their Generalizations III*, Levico
- **Feb 2018** Winter School *Geometry, Algebra and Combinatorics of Moduli Spaces and Configurations II*, Dobbiaco.
- **June 2018** *Algebraic Combinatorics in Ancona*, Ancona.
- **Sept 2018** Summer School *Pisa-Tor Vergata-Hokkaido Summer School on Mathematics and its Applications*, Pisa.
- **Oct 2018** *VI incontro sulla combinatoria dei sistemi di radici.*, Pisa.
- **Nov 2018** *Representation Theory in Rome and Beyond* , Rome.
- **Feb 2019** Winter School *Geometry, Algebra and Combinatorics of Moduli Spaces and Configurations III*, Dobbiaco.
- **Sept 2019** *Algebraic Combinatorics in Genova*, Genova.
- **Sept 2019** Summer School *Representation Theory In Venice - A conference in honour of Corrado De Concini*, Venice.
- **Nov 2019** *A Representation Theory Summit in Rome*, Rome.
- **Jan 2020** *Thematic trimester program on Representation theory - Institut Henri Poincaré*, Paris.
- **Feb 2020** Winter School *Geometry, Algebra and Combinatorics of Moduli Spaces and Configurations IV*, Dobbiaco.
- **Jul 2021** *Algebraic Combinatorics of the Symmetric Groups and Coxeter Groups*, Cetraro.
- **Sept 2021** *Vertex Algebras, W-Algebras and Related Structures*, Rome.
- **May 2022** *”100 years UMI - 800 years UniP” Meeting*, Padova.
- **Jul 2022** *Algebraic Combinatorics of the Symmetric Groups and Coxeter Groups II*, Cetraro.

LANGUAGE SKILLS

- PET-Preliminary English Test. (B1)
- GESE-Graded Examinations in Spoken English- Grade 8. (B2.2)

COMPUTER SKILLS

- **ECDL** (European Computer Driving Licence.)
- **Operating System Experiences:** Windows, Linux
- **Computer Algebra Programs:** During the doctoral studies I acquired competences in the use of LiE and SageMath

OTHER ACTIVITIES

In 2008 I won the Bronze Medal at the Italian Mathematics Olympiad.
From 2012 to 2014 I was math students representative at Department of Mathematics in Pisa.
Currently I am National Arbiter (Arbitro Nazionale) of the Italian Chess Federation.