

FRANCESCO SALA

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Web: www.salafrancesco.altervista.org
Citizenship: Italian
Date of birth: November 11th, 1983
Place of birth: Altofonte (PA), Italy

CURRENT POSITION

Kavli IPMU, Japan
Postdoctoral Fellow November 2016 - present

EMPLOYMENTS

University of Western Ontario, London, Canada
Postdoc (Assistant Professor and Postdoctoral Fellow) August 2014 - July 2016
Heriot-Watt University, Edinburgh, United Kingdom
Postdoctoral Research Associate to Prof. R. J. Szabo March 2012 - February 2014

EDUCATION

SISSA, Trieste, Italy and Université Lille 1, France
Ph.D. in Geometry and Doctorat en Mathématiques Pures (co-tutorial thesis) October 2011
Supervisors: U. Bruzzo and D. Markushevich
Università degli Studi di Trieste, Italy
Master's Degree in Mathematics (in collaboration with SISSA) - 110/110 cum laude October 2008
Università degli Studi di Palermo, Italy
Bachelor's Degree in Mathematics - 110/110 cum laude July 2006

ADDITIONAL DIPLOMA

SISSA, Trieste, Italy
Diploma "Percorso Formativo Comune" October 2008

RESEARCH INTERESTS

Hall algebras and their refined versions (cohomological, K-theoretical, etc), moduli spaces of sheaves, quiver varieties, geometric representation theory, mathematical physics, gauge theory

PUBLICATIONS AND PREPRINTS

10. **F. Sala** and O. Schiffmann. Cohomological Hall algebra of Higgs sheaves on a curve. arXiv:1801.03482. — submitted
9. **F. Sala** and O. Schiffmann. Hall algebra of the infinite root stack of a curve and a geometric model for $U_q(\widehat{\mathfrak{sl}}(\mathbb{Q}/\mathbb{Z}))$. arXiv:1711.07391.
8. P. Eyssidieux and **F. Sala**. Instantons and framed sheaves on Kähler Deligne-Mumford stacks. *Annales de la Faculté des Sciences de Toulouse*, to appear.
7. M. Pedrini, **F. Sala** and R. J. Szabo. AGT relations for abelian quiver gauge theories on ALE spaces. *Journal of Geometry and Physics*, 2016, 103, 43-89.

6. U. Bruzzo, M. Pedrini, **F. Sala** and R. J. Szabo. Framed sheaves on root stacks and supersymmetric gauge theories on ALE spaces.
Advances in Mathematics, 2016, 288, 1175–1308.
5. U. Bruzzo, **F. Sala** and R. J. Szabo. $\mathcal{N} = 2$ quiver gauge theories on A-type ALE spaces.
Letters in Mathematical Physics, 2015, 105, no. 3, 401-445.
4. U. Bruzzo and **F. Sala**. Framed sheaves on projective stacks.
Advances in Mathematics, 2015, 272, 20-95.
3. **F. Sala**. Restriction theorems for μ -(semi)stable framed sheaves.
Journal of Pure and Applied Algebra, 2013, 217, no. 12, 2320-2344.
2. **F. Sala**. Symplectic structures on moduli spaces of framed sheaves on surfaces.
Central European Journal of Mathematics, 2012, 10, no. 4, 1455-1471.
1. Some topics in the geometry of framed sheaves and their moduli spaces.
Ph.D. Dissertation. SISSA, Trieste, Italy and Université Lille 1, France (2011).

EDITORIAL WORK

Special Issue Managing Editor. “Interactions between Geometry and Physics. A topical issue in honor of Ugo Bruzzo’s 60th birthday”, *Journal of Geometry and Physics*

Guest Editor (with U. Bruzzo). Special issue on “Instanton Counting: Moduli Spaces, Representation Theory and Integrable Systems”, *Journal of Geometry and Physics*

VISITING POSITIONS

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|---|-------------------------------|
| 23. Université de Paris-Sud, Paris, France. (4 weeks) | May and June 2018 (expected) |
| 22. MIT, USA. (2 weeks) | September 2017 |
| 21. SISSA, Trieste, Italy. (6 weeks) | June and July 2017 |
| 20. Centre for Quantum Geometry of Moduli Spaces, Aarhus, Denmark. (1 week) | June 2017 |
| 19. Université de Paris-Sud, Paris, France. (3 weeks) | May 2017 |
| 18. Université de Paris-Sud, Paris, France. (2 weeks) | February 2017 |
| 17. University of Waterloo, Canada. (1 week) | November 2016 |
| 16. IHÉS, France. (8 weeks) | September 2016 - October 2016 |
| 15. SISSA, Trieste, Italy. (4 weeks) | July 2016 |
| 14. Institut Henri Poincaré, Paris, France. (8 weeks)
Thematic trimester devoted to “Program on the mathematics of string theory” | May 2016 - June 2016 |
| 13. Université de Paris-Sud, Paris, France. (1 week) | February 2016 |
| 12. Université de Paris-Sud, Paris, France. (5 weeks) | April 2015 - May 2015 |
| 11. Rutgers University, USA. (1 week) | February 2015 |
| 10. LPTHE, Université Pierre et Marie Curie, Jussieu, Paris, France. (1 week) | December 2014 |
| 9. Laboratory of Algebraic geometry and its application, SU-HSE, Moscow, Russia. (4 weeks) | June 2014 |
| 8. IHÉS, France. (6 weeks) | March 2014 - May 2014 |
| 7. Institut Henri Poincaré, Paris, France. (6 weeks)
Research in Paris Program “AGT conjecture on ALE spaces by means of framed sheaves” | February 2014 - March 2014 |
| 6. SISSA, Trieste, Italy. (3 weeks) | December 2012 |

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| 5. SISSA, Trieste, Italy. (6 weeks) | January 2012 - February 2012 |
| 4. IHÉS, France. (10 weeks) | November 2011 - January 2012 |
| 3. Université Lille 1, France. (16 weeks) | February 2011 - May 2011 |
| 2. University of Pennsylvania, USA. (3 weeks) | December 2010 |
| 1. Université Lille 1, France. (12 weeks) | April 2010 - June 2010 |

CONFERENCE TALKS

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|---|----------------------------|
| 15. University of Glasgow, UK
<i>Geometric Representation Theory</i> | July 3rd - 7th 2017 |
| 14. LMPT Tours, France
<i>Quantum groups, Special functions and Integrable systems</i> | May 17th - 19th 2017 |
| 13. Perimeter Institute, Waterloo, Canada
<i>Hitchin Systems in Mathematics and Physics</i> | February 13th - 17th 2017 |
| 12. Università degli Studi di Genova, Italy
<i>Christmas Workshop on Quivers, Moduli Spaces and Integrable Systems</i> | December 19th - 21st 2016 |
| 11. Fields Institute, Toronto, Canada
<i>Workshop on Algebraic Varieties</i> | November 21st - 22nd 2015 |
| 10. Fields Institute, Toronto, Canada
<i>Workshop on Algebraic Varieties</i> | March 7th - 8th 2015 |
| 9. Université de Paris-Sud, Paris, France
<i>Workshop on DAHA, Hall Algebras, Torus Knots and Combinatorics</i> | November 17th - 20th 2014 |
| 8. Università degli Studi di Padova, Italy
<i>Workshop on Algebraic Analysis and Geometry</i> | September 23rd - 24th 2013 |
| 7. Università degli Studi di Genova, Italy
<i>Christmas Workshop on Moduli Spaces and Integrable Systems</i> | December 19th - 21st 2012 |
| 6. Hausdorff Center for Mathematics, Bonn, Germany
<i>Workshop "String-Math 2012" (contributed talk)</i> | July 16th - 21st 2012 |
| 5. SISSA, Trieste, Italy
<i>Workshop on Geometry, Integrability, Quantization</i> | July 9th - 12th 2012 |
| 4. SISSA, Trieste, Italy
<i>Workshop Einstein at SISSA 2011</i> | July 6th - 12th 2011 |
| 3. SISSA, Trieste, Italy
<i>Workshop TULSF VI</i> | September 24th 2010 |

2. Chern Institute of Mathematics, Nankai University, China
Workshop on Categorical Methods in Geometry and Gauge Theory

August 29th - September 3rd 2010

1. SISSA, Trieste, Italy
Workshop Einstein at SISSA 2010

June 5th - 9th 2010

SEMINAR TALKS AND COLLOQUIA

2018 - no. 3

Kavli IPMU (GTM Seminar — expected), Université de Grenoble (Séminaire de Algèbre et Géométries — expected), Université de Strasbourg (Séminaire Quantique — expected)

2017 - no. 10

Rutgers University (Geometry, Symmetry and Physics Seminar), MIT (Geometric Representation Theory), SISSA - Trieste (Colloquium), Centre for Quantum Geometry of Moduli Spaces - Aarhus (Aarhus Differential Algebraic Geometry Seminars), Department of Physics and Astronomy - Uppsala University, Institut de Mathématiques de Jussieu and ENS - Paris (Séminaire de Géométrie Algébrique), Institut de Mathématiques de Bourgogne - Dijon (Séminaire de Géométrie et Systèmes Dynamiques), Institut Henri Poincaré - Paris (Séminaire de Géométrie et Quantification), Institut Élie Cartan de Lorraine (Séminaire de Analyse, Géométrie et Algèbre), Kavli IPMU (GTM Seminar)

2016 - no. 9

University of Waterloo (Geometry and Topology Seminar), Université Lille 1 (Séminaire de Géométrie Algébrique), Université d'Angers (Séminaire de Géométrie Algébrique), SISSA - Trieste (Geometry Seminar), Università degli Studi di Torino (Seminari di Algebra e Geometria Algebrica), University of British Columbia (Algebra and Algebraic Geometry Seminar), Institut de Mathématiques de Jussieu - Paris (Séminaire Groupes, Représentations et Géométrie), Université de Grenoble (Séminaire de Algèbre et Géométries), Kansas State University (Colloquium)

2015 - no. 8

Perimeter Institute for Theoretical Physics (Geometric Representation Theory Seminar), Fields Institute - Toronto (Geometric Representation Theory Seminar), Georgia Southern University (Colloquium), University of Pennsylvania (Math-Physics Joint Seminar), Rutgers University (Geometry, Symmetry and Physics Seminar), University of Western Ontario (Geometry and Topology Seminar, Noncommutative Geometry Seminar and Algebra Seminar)

2014 - no. 12

LP THE - Université Pierre et Marie Curie - Paris, University of Waterloo (Geometry and Topology Seminar), University of Western Ontario (Geometry and Topology Seminar), SISSA - Trieste (Geometry Seminar), Laboratory of Algebraic geometry and its application - SU-HSE - Moscow (Geometric Representation Theory Seminar and Seminar on Geometric Structures on Manifolds), Université de Nice Sophia-Antipolis (Séminaire d'Algèbre, Topologie et Géométrie), University of Luxembourg (Seminar in Algebra, Geometry, and Quantization), Université de Rennes 1 (Séminaire de Géométrie Algébrique), Institut de Mathématiques de Jussieu - Paris (Séminaire Caen Cergy Clermont Paris - Théorie des Représentations and Séminaire de Géométrie Algébrique), University of Edinburgh (EDGE Seminar)

2013 - no. 3

Maxwell Institute for Mathematical Sciences - Edinburgh, Université d'Angers (Séminaire de Physique Mathématique), Université de Grenoble (Séminaire de Algèbre et Géométries)

2012 - no. 3

Maxwell Institute for Mathematical Sciences - Edinburgh, Université Lille 1 (Séminaire de Géométrie Algébrique), SISSA - Trieste (Students' Seminar in Algebraic Geometry - expository talk)

2011 - no. 4

Université Lille 1 (Séminaire de Géométrie Algébrique), Université d'Angers (Séminaire de Physique Mathématique)

matique), Université de Grenoble (Séminaire de Algèbre et Géométries), Université de Nantes (Séminaire de Topologie, Géométrie et Algèbre)

2010 - no. 1

University of Pennsylvania (Math-Physics Joint Seminar)

ORGANIZATIONAL ACTIVITIES

9. Organizer (with D. Baraglia, P. Hekmati, T. Mochizuki and M.-H. Saito) of the *Conference on Moduli spaces, Representation theory and Quantization*
RIMS, Kyoto, Japan June 17th - 21st 2019 (expected)
8. Organizer (with U. Bruzzo and A. Grassi) of the *CIME School on Geometric Representation Theory and Gauge Theory*
Cetraro (CS), Italy June 25th - 29th 2018 (expected)
7. Organizer (with U. Bruzzo, F. Rodriguez Villegas and J. Stoppa) of the *School and Workshop on Higgs moduli spaces and character varieties (SWAGP2017)*
SISSA, Trieste, Italy June 19th - 23rd 2017
6. Organizer (with D. Barilari, F. Fanelli and A. Lerario) of the *Workshop From students to mathematicians: an excellence Master program in Trieste*
SISSA and Università degli Studi di Trieste, Italy June 14th - 16th 2017
5. Organizer (with J. Kamnitzer and O. Schiffmann) of the *Workshop on Hall algebras, enumerative invariants and gauge theories*
Fields Institute, Toronto, Canada November 14th - 18th 2016
4. Organizer (with U. Bruzzo, E.-D. Diaconescu, F. Perroni and C. Bai) of the *Workshop on Moduli Spaces in Algebraic Geometry and Mathematical Physics*
Chern Institute of Mathematics, Tianjin, China September 14th - 18th 2015
3. Organizer (with M. Jardim, F. Perroni et al.) of the *Workshop on Interactions between Geometry and Physics, a conference in honor of Ugo Bruzzo's 60th birthday*
Guarujá, São Paulo, Brazil August 17th - 21st 2015
2. Organizer (with U. Bruzzo, D. Markushevich, V. Rubtsov and S. Shadrin) of the *Workshop on Instanton Counting: Moduli Spaces, Representation Theory and Integrable Systems*
Lorentz Center, Leiden, The Netherlands June 16th - 20th 2014
1. Organizer (with U. Bruzzo et al.) of the *VBAC2013 (2013 meeting of the Vector Bundles on Algebraic Curves Group) Hilbert Schemes, Sheaves and Representation Theory*
SISSA, Trieste, Italy June 17th - 21st 2013

GRANTS

4. JSPS KAKENHI Grant-in-Aid for Research Activity Start-up
Hall algebras and gauge theory on a surface (¥ 1mm) 2017 - 2018
3. Foundation Compositio Mathematica
Conference Grant 2018
CIME School on Geometric Representation Theory and Gauge Theory, Cetraro, Italy
2. Foundation Compositio Mathematica
Conference Grant 2016
Workshop on Hall algebras, enumerative invariants and gauge theories, Fields Institute, Toronto, Canada
1. Foundation Compositio Mathematica
Conference Grant 2015
Workshop on Moduli spaces in Algebraic Geometry and Mathematical Physics, Chern Institute of Mathematics, Tianjin, China

FELLOWSHIPS

11. IHÉS, France
Visiting Position Fellowship September 2016 - October 2016
10. Institut Henri Poincaré, Paris, France
Visiting Position Fellowship for a thematic trimester
founded by Foundation Mathématiques de Paris May 2016 - June 2016
9. Laboratory of Algebraic geometry and its application, SU-HSE, Moscow, Russia
Visiting Position Fellowship June 2014
8. IHÉS, France
Visiting Position Fellowship March 2014 - May 2014
7. Institut Henri Poincaré, Paris, France
Research in Paris Fellowship February 2014 - March 2014
6. The Leverhulme Trust, United Kingdom
Postdoctoral Research Associate Fellowship March 2012 - February 2014
5. IHÉS, France
Visiting Position Fellowship November 2011 - January 2012
4. SISSA, Trieste, Italy
Ph.D. Student Fellowship November 2008 - October 2011
3. GREFI-GRIFGA, INDAM, Italy
Visiting Student Fellowship February 2011 - April 2011
2. SISSA, Trieste, Italy
Erasmus Placement Fellowship February 2011 - April 2011
1. SISSA, Trieste, Italy
Borsa di Studio Percorso Formativo Comune October 2006 - September 2008

SUPERVISION OF A PHD STUDENT

Mattia Pedrini (2010 - 2013, SISSA, Trieste, Italy, with Ugo Bruzzo) Thesis defended in October 2013
Title: *"Moduli spaces of framed sheaves on stacky ALE spaces, deformed partition functions and the AGT conjecture"*

TEACHING EXPERIENCE

- Instructor.** University of Western Ontario, Canada 2014 - 2016
- Math 1228 B: Methods of Finite Mathematics. Winter 2016
 - Math 1229 A: Methods in Matrix Algebra. Fall 2015
 - Calculus 1301 B: Calculus II. Winter 2015
 - Math 1229 A: Methods in Matrix Algebra. Fall 2014
- Teaching Assistant.** Trieste, Italy 2009 - 2011
- Algebra I, 2010 - 2011, at Università degli Studi di Trieste
 - Sheaf theory and metrics on fiber bundles, 2009 - 2010, at SISSA, Trieste, Italy

OUTREACH ACTIVITIES

SISSA, Trieste, Italy September 23rd 2011
Collaborator for the event *Notte dei Ricercatori 2011: STAR - Science Trieste And Researchers*

Università degli Studi di Trieste, Italy September 2007
Co-director of the video *Perché io ho scelto la matematica? (Why have I chosen to study Maths?)*, shown during the final meeting of the biennial project *"Lauree scientifiche - Orientamento e formazione degli insegnanti - Matematica"*

OTHER ACADEMIC ACTIVITIES

Referee for Adv. Math., Bull. Sci. Math., Int. Math. Res. Not. IMRN, J. Algebraic Geom., J. Geom. Phys., J. Pure Appl. Algebra, Lett. Math. Phys., Sel. Math. New Ser., SIGMA

Committee Member:

Young Scientist Award, supported by Elsevier Publishing House. June 2017

Young Scientist Award, supported by Elsevier Publishing House, in honor of U. Bruzzo's 60th anniversary. September 2015

Coordinator:

Geometry and Topology Seminar (with R. Jardine). Department of Mathematics, University of Western Ontario, Canada. 2015 - 2016

University and Departmental Services:

- University of Western Ontario, Canada October 2014 - June 2015
International Postdoctoral Representative at the Postdoctoral Association at Western
- SISSA, Trieste, Italy December 2008 - October 2011
Students' Representative at the Mathematical Physics Sector
- Università degli Studi di Trieste, Italy October 2006 - October 2008
Students' Representative at the Dipartimento di Matematica

Reviewer for Mathematical Reviews

Member of

- GNSAGA-INdAM
- research project PRIN *Geometria delle varietà algebriche e dei loro spazi di moduli*, co-funded by MIUR (cofin 2008). November 2008 - October 2011

LANGUAGES

Italian: Mother tongue. **English:** Fluent knowledge. **French:** Fluent knowledge. **Spanish:** Fair knowledge.

Updated on February 24th, 2018