Antoine Bourget

Personal Data

Birth:	Colombes, France | 3 January 1989
Email:	antoine.bourget@polytechnique.org
Website:	antoinebourget.org
Languages:	French, English, Spanish (fluent).
	Chinese (intermediate).

Work Experience

Current	Institut de Physique théorique, CEA Saclay, France
Oct 2021	and École Normale Supérieure, Paris, France
	Postdoctoral researcher, Junior Research Chair
Sep 2021	Imperial College, London, UK
Oct 2018	*Postdoctoral researcher in High Energy Physics*
Sep 2018	University of Oviedo, Spain
Sep 2016	*Postdoctoral researcher in High Energy Physics*
Current	Ministry of Economic Affairs, Paris, France
Sep 2011	*Ingénieur du Corps des Mines (actuellement en détachement).*

Education

Jul 2016	PhD, École Normale Supérieure, Paris, France
	Mention très bien avec les félicitations du jury
	Thesis: Modularity and Vacua in $\mathcal{N} = 1^*$ Supersymmetric Gauge Theories
	Advisor: J. Troost
	Examiners: O. Aharony, C. Bachas, A. Hanany, M. Petrini, S.P. Kumar, H. Samtleben
2011-2012	École Nationale Supérieure des Mines, Paris, France
	Admission to the *Corps des Mines* (rank: 3rd).
2008-2011	École Polytechnique, Palaiseau, France
	Major in Mathematics and Theoretical Physics. GPA: 4.0
	Admission from the MP* Classe Préparatoire (rank: 2nd).

Teaching

2022	TA in Symmetries in Physics (with F. Chevy). MSc level, ENS Paris.
2021-2023	TA in Particle Physics and the Standard Model (with A. Kashani-Poor). Undergrad level, ENS Paris.
2021	50th British Universities Summer School in Theoretical Elementary Particle Physics (BUSSTEP) Queen Mary University, London.
2020-2021	Lecture on Algebraic singularities in Physics. MSc in Quantum Fields and Fundamental Forces Imperial College London.
2014-2016	TA in Quantum Mechanics (with F. Chevy). Undergrad level, ENS Paris.
2015-2016	TA in General Relativity (with G. Esposito-Farèse). MSc level, ENS Paris.

Student supervision:

- 2022-2023: Loïc Honet (M2 Theoretical and Mathematical Physics, Ludwig-Maximilians University, Germany, *Generalized symmetries in QFT*)
- 2022-2023: Simon Astrup-Gay (M1, ENS Paris, *Magnetic monopoles*)
- 2022: Rodrigue Orageux (M1, ENS Paris, *Formalisme ADM de la Relativité Générale*)
- 2021: Théodore Bertrand (M1, ENS Paris, *Quivers in String Theory: an Introduction*)
- 2021: Diogo Santos (M3R, Imperial College London, *An Introduction to Quivers in 3d $N = 4$ Superconformal Field Theories*)
- 2020: Min Lin (Undergraduate Research Opportunities Programme, Imperial College London, *Theories of class S*)
- 2020: Hai Châu Nguyên (L3, ENS Lyon, *Classification des algèbres de Lie complexes, motivations physiques et carquois*)

Activities

- **Reviewer** for JHEP, Nuclear Physics B, AMS Math Reviews.
- **Organizer** of the following international conferences and workshops:
  1. Workshop on *Geometry and Symmetries of SCFTs*, Mainz Institute for Theoretical Physics, Germany. June 17-21, 2024.
  2. School and Workshop on *Symplectic Singularities and Quantum Theory* (Amiens, July 10-21, 2023).
     https://sites.google.com/view/symplectic-singularities-susy/home
  3. Workshop on *The Geometry, Algebra, and Physics of Higgs Bundles*, Banff International Research Station (UBC Okanagan), Canada. May 28 to June 2, 2023.
     https://www.birs.ca/events/2023/5-day-workshops/23w5082

4. Workshop at the Simons Center for Geometry and Physics, *5d N=1 SCFTs and Gauge Theories on Brane Webs* (October 17-21, 2022). https://scgp.stonybrook.edu/archives/35039
5. SCGSC 2016, Imperial College London, January 7-8, 2016. https://sites.google.com/site/scgsc2016/

- Organizer of several seminar series: Paris Rencontres Théoriciennes (2022-2023), the Imperial College String Theory Seminars (2020-2022), the London Triangle and Polygon seminars (2018-2021), the Theory Group Colloquium (2018-2020). Creation and organization of the student and postdoc seminar series at IPhT, Saclay.
- Animation and Organization of the Institute Retreat of IPhT, Autrans, France (May 2022).

Outreach

- **Channel Scientia Egregia** on Youtube, filling the gap between undergrad and research level in math and theoretical physics ($> 200,000$ hours total views). https://www.youtube.com/user/antoinebrgt
- Other outreach activities:
  - *I'm a Scientist* (connecting scientists with highschool in the UK)
  - Imperial College Science Forum
  - TALENS association (maths and physics classes in disadvantaged highschools)
  - Phyique pour tous (lectures at ENS).

Publications

All my publications are available at https://inspirehep.net/authors/1394491.

- A. Bourget, S. Giacomelli and J. F. Grimminger, *FI-flows of 3d N=4 Theories*. [arXiv:2302.03698]
- A. Bourget, A. Collinucci and S. Schafer-Nameki, *Generalized Toric Polygons, T-branes, and 5d SCFTs*. [arXiv:2301.05239]
- A. Bourget and J. F. Grimminger, *Fibrations and Hasse diagrams for 6d SCFTs*. JHEP 12 (2022) 159 [arXiv:2209.15016]
- A. Bourget, J. F. Grimminger, A. Hanany, and Z. Zhong, *The Hasse Diagram of the Moduli Space of Instantons*. JHEP 08 (2022) 283. [arXiv:2202.01218]
- A. Bourget, A. Dancer, J. F. Grimminger, A. Hanany, and Z. Zhong, *Partial Implosions and Quivers*. JHEP 07 (2022) 049. [arXiv:2112.10825]
- A. Bourget, J. F. Grimminger, A. Hanany, Rudolph Kalveks and Z. Zhong, *Higgs Branches of U/SU Quivers via Brane Locking*. JHEP 08 (2022) 061. [arXiv:2111.04745]
- A. Bourget, J. F. Grimminger, M. Martone and G. Zafrir, *Magnetic quivers for rank 2 theories*. JHEP 03 (2022) 208. [arXiv:2110.11365]
- A. Bourget and A. Hanany, *Hasse diagrams and Higgs branches*, in *The Pollica perspective on the (super)-conformal world*. J.Phys.A 54 (2021) 30, 303001. [CERN Document Server]
- A. Bourget, J. F. Grimminger, A. Hanany, Rudolph Kalveks, M. Sperling and Z. Zhong, *Folding Orthosymplectic Quivers*. JHEP 12 (2021) 070. [arXiv:2107.00754]

- G. Arias-Tamargo, A. Bourget and A. Pini, *Discrete gauging and Hasse diagrams*, SciPost Phys. 11 (2021) 2, 026. [arXiv:2105.08755]
- A. Bourget, A. Dancer, J. F. Grimminger, A. Hanany, F. Kirwan and Z. Zhong, *Orthosymplectic Implosions*, JHEP 08 (2021) 012. [arXiv:2103.05458]
- A. Bourget, J. F. Grimminger, A. Hanany, M. Sperling and Z. Zhong, *Branes, Quivers, and the Affine Grassmannian*. [arXiv:2102.06190]
- M. van Beest, A. Bourget, J. Eckhard and S. Schafer-Nameki, *(5d RG-flow) Trees in the Tropical Rain Forest*, JHEP 03 (2021) 241. [arXiv:2011.07033]
- A. Bourget, Simone Giacomelli, J. F. Grimminger, A. Hanany, M. Sperling and Z. Zhong, *S-fold magnetic quivers*, JHEP 02 (2021) 054. [arXiv:2010.05889]
- M. van Beest, A. Bourget, J. Eckhard and S. Schafer-Nameki, *Symplectic Leaves and 5d Higgs Branches in the Polygonesian Tropical Rain Forest*, JHEP 11 (2020) 124. [arXiv:2008.05577]
- A. Bourget, J. F. Grimminger, A. Hanany, Rudolph Kalveks, M. Sperling and Z. Zhong, *Magnetic Lattices for Orthosymplectic Quivers*, JHEP 12 (2020) 092. [arXiv:2007.04667]
- A. Bourget, J. F. Grimminger, A. Hanany, M. Sperling, G. Zafrir and Z. Zhong, *Magnetic quivers for rank 1 theories*, JHEP 09 (2020) 189. [arXiv:2006.16994]
- A. Bourget, A. Hanany, and D. Miketa, *Quiver origami: discrete gauging and folding*. JHEP 01 (2021) 086 [arXiv:2005.05273]
- A. Bourget, J. F. Grimminger, A. Hanany, M. Sperling and Z. Zhong, *Magnetic Quivers from Brane Webs with O5 Planes*, JHEP 07 (2020) 204. [arXiv:2004.04082]
- P. Argyres, A. Bourget and M. Martone, *On the moduli spaces of 4d N=3 SCFTs I: triple special Kähler structure*, arXiv:1912.04926. [arXiv:1912.04926]
- A. Bourget, S. Cabrera, J. F. Grimminger, A. Hanany and Z. Zhong, *Brane Webs and Magnetic Quivers for SQCD*, JHEP 03 (2020) 176. [arXiv:1909.00667]
- A. Bourget, S. Cabrera, J. F. Grimminger, A. Hanany, M. Sperling, A. Zajac and Z. Zhong, *The Higgs Mechanism - Hasse Diagrams for Symplectic Singularities*, JHEP 01 (2020) 157. [arXiv:1908.04245]
- P. Argyres, A. Bourget and M. Martone, *Classification of all $\mathcal{N} \geq 3$ moduli space orbifold geometries at rank 2*, SciPost Phys. 9 (2020) 083. [arXiv:1904.10969]
- Guillermo Arias-Tamargo, A. Bourget, A. Pini and D. Rodríguez-Gómez, *Discrete gauge theories of charge conjugation*, Nucl.Phys. B946 (2019) 114721. [arXiv:1903.06662]
- A. Bourget, D. Rodríguez-Gómez and J. Russo, *Universality of Toda equation in N=2 superconformal field theories*, JHEP 1902 (2019) 011. [arXiv:1810.00840]
- A. Bourget, A. Pini and D. Rodríguez-Gómez, *Gauge theories from principally extended disconnected gauge groups* , Nucl.Phys. B940 (2019) 351-376. [arXiv:1804.01108]
- A. Bourget, D. Rodríguez-Gómez and J. Russo, *A limit for large R-charge correlators in N=2 theories*, JHEP 1805 (2018) 074. [arXiv:1803.00580]
- A. Bourget and J. Troost, *The Conformal Characters*, JHEP 1804 (2018) 055. [arXiv:1712.05415]
- A. Bourget, A. Pini, D. Rodríguez-Gómez, *Towards the deconstruction of the type D (2,0) theory*, JHEP **1712** (2017). [arXiv:1710.10247]

- A. Bourget and J. Troost, *Permutations of Massive Vacua*, JHEP **1705** (2017) 042. [arXiv:1702.02102]
- A. Bourget and A. Pini, *Non-Connected Gauge Groups and the Plethystic Program*, JHEP **1710** (2017) 033. [arXiv:1706.03781]
- A. Bourget and J. Troost, *The Arithmetic of Supersymmetric Vacua*, JHEP **07** (2016) 036. [arXiv:1606.01022]
- A. Bourget, *Modularity and Vacua in $\mathcal{N} = 1^*$ Supersymmetric Gauge Theory*, July 2016, PhD thesis. [PDF on tel.archives-ouvertes.fr]
- A. Bourget and J. Troost, *The Covariant Chiral Ring*, JHEP **03** (2016) 163. [arXiv:1512.03649]
- A. Bourget and J. Troost, *On the $\mathcal{N} = 1^*$ Gauge Theory on a Circle and Elliptic Integrable Systems*, JHEP **01** (2016) 097. [arXiv:1511.03116]
- A. Bourget and J. Troost, *Counting the massive vacua of $\mathcal{N} = 1^*$ super Yang-Mills theory*, JHEP **1508** (2015) 106. [arXiv:1506.03222]
- A. Bourget and J. Troost, *Duality and modularity in elliptic integrable systems and vacua of $\mathcal{N} = 1^*$ gauge theories*, JHEP **1504** (2015) 128. [arXiv:1501.05074]

Proceedings:

- F. Alday, P. Argyres, M. Lemos, M. Martone, L. Rastelli *et al*, *The Pollica perspective on the (super)-conformal world*. J.Phys.A 54 (2021) 30, 303001 (2021).
- A. Bourget, *Affine Grassmannians and Brane Systems*, in the Nankai Symposium on Mathematical Dialogues, ISBN 978-981-19-2327-2
- A. Bourget, *The Geometry of Quivers*, MaxEnt 2022—the 41st International Workshop on Bayesian Inference and Maximum Entropy Methods. DOI: 10.3390/psf2022005042

Invited Speaker at International Conferences

- 13/10/2022, Geometry of (S)QFT, Simons Center for Geometry and Physics, USA. " Full Vacuum Moduli Spaces in 6d SCFTs". (video)
- 15/07/2022, String Math 2022, University of Warsaw, Poland. "Magnetic Quivers for Symplectic Singularities". (video)
- 21/07/2022, MaxEnt2022, Institut Henri Poincaré, Paris, France. "The Geometry of Quivers".
- 27/04/2022, Eurostrings, Lyon, France. "Exploring the Landscape of SCFTs with Magnetic Quivers". (slides)
- 11/02/2022, Geometrization of (S)QFT in $D \leq 6$, Winter Conference at Aspen, USA. "On the Moduli Space of Instantons".
- 10/01/2022, Connections between String Theory and Special Holonomy Workshop, Oxford, UK. "Magnetic quivers for singular hyperKähler spaces".
- 23/09/2021, Geometry of (S)QFT, Simons Center for Geometry and Physics, Stony Brook, USA. "Higgs branches after lockdown". [video link]
- 03/08/2021, Nankai Symposium on Mathematical Dialogues, Chern Institute of Mathematics, Nankai University, Tianjin, China. "Branes, Quivers and Affine Grassmannians". [video link] (slides)

- 20/07/2021, Workshop on Strings, Branes and Gauge Theories, APCTP Pohang, South Korea. "Non simply laced quivers and Moduli spaces of 4d SCFTs".
- 04/12/2020, Recent Advances in QFT and Geometry "Moduli space of 5d SCFTs, a walk in the tropical rainforest".
  [video link] (slides)
- 01/06/2020 Simons Collaboration: Moduli of special holonomy metrics and their periods Lectures on Hasse diagrams for Symplectic Singularities via Magnetic Quivers
  [video link] (notes)
- 09/12/2019 Joburg Workshop on String Theory, Calabi–Yaus, Machine Learning, and Aspects of 6D QFT, South Africa. "Symplectic Singularities".
- 18/07/2018 Supersymmetric theories, dualities and deformations, Albert Einstein Center, Bern, Switzerland. "The importance of being disconnected".

Other talks and seminars

- 07/03/23, Quantum Computing Workshop, IPhT Saclay. "Traversable wormholes on quantum computers".
- 20/02/23, University of Oxford, Mathematical Institute. "Generalized Toric Polygons, T-branes, and 5d SCFTs".
- 10/02/23, Imperial College London, Quiver meeting, "Generalized Toric Polygons, T-branes, and 5d SCFTs". [video link]
- 07/09/2022, Ecole Normale Supérieure, Paris. "Supersymmetry, between Physics and Mathematics". (slides)
- 10/05/2022, Albert Einstein Institute, Potsdam. "Exploring the landscape of SCFTs". (slides)
- 06/04/2022, SISSA, Trieste. "Brane Webs and Quivers".
- 10/03/2022, Ecole des Mines de Paris, "Quantum field theory in the third millenium". (slides)
- 24/11/2021, Institut de Mathématiques de Bourgogne, Dijon. "What is a Magnetic Quiver?".
- 15/11/2021, IPhT Saclay, Mathematical Physics group, "Quiver subtraction and Hasse diagrams".
- 06/10/2021, Institut de Physique théorique, CEA Saclay, "A very short introduction to quivers".
- 05/10/2021, ENS Paris, "What is a Magnetic Quiver?".
- 04/12/2020, Imperial College, "The Higgs branch of 5d SCFTs: updates and challenges". `https://www.imperial.ac.uk/theoretical-physics/seminars/quiver-meetings/`
- 17/09/2020 SISSA, Workshop on Geometric Correspondences of Gauge Theories X, "Magnetic quivers for rank-1 4d $\mathcal{N} = 4$ theories".
- 17/07/2020 Quiver Meeting, Imperial College, "The Affine Grassmannian and Quivers". [video link]

- 19/12/2019 Rencontres théoriciennes, Institut Henri Poincaré, Paris, France. "Hasse diagrams and Higgs branches".
- 06/12/2019 Utrecht University, "Hasse diagrams and Higgs branches".
- 25/10/2019 Durham University, "Hasse diagrams and Higgs branches".
- 21/10/2019 University of Oxford, "Hasse diagrams and Higgs branches".
- 09/10/2019 Joint seminar, Institute for Theoretical Physics, Leuven, "Hasse diagrams and Higgs branches".
- 30/09/2019 CEICO, Prague, "Hasse diagrams and Higgs branches".
- 21/05/2019 Oviedo University, "Magnetic quivers and Brane Webs for 4d N=2 SQCD".
- 03/04/2019 DESY, Hamburg, "Brane webs and the SQCD Higgs Branch".
- 30/11/2018 Quiver Meeting, Imperial College, "Computing Hilbert series from free resolutions".
- 09/10/2018 Imperial College London, "Extremal correlators in 4d $\mathcal{N} = 2$ SCFTs and Toda equations".
- 02/07/2018 Institut de Physique Nucléaire de Lyon, "Moduli spaces of theories with disconnected gauge groups".
- 05/06/2018 University of Torino, "The importance of being disconnected: principal extension gauge theories".
- 12/02/2018 Oviedo University, "Nilpotent orbits and quiver theories".
- 24/01/2018 Uppsala University, "Towards deconstruction of type D (2,0) theory".
- 22/01/2018 Nordita, "Towards deconstruction of type D (2,0) theory".
- 07/10/2017 Universitat de Barcelona, "Towards deconstruction of type D (2,0) theory".
- 04/12/2017 CPHT, Ecole Polytechnique, "Quivers, Hilbert series and Deconstruction"
- 30/11/2017 LPMT, Tours, "Théories de carquois et Séries de Hilbert"
- 31/10/2017 Università Milano-Bicocca, "Towards deconstruction of type D (2,0) theory"
- 27/09/2017 Imperial College London, "Higgs branch Hilbert series and non-connected gauge groups"
- 04/10/2016 Universidad de Oviedo, "A dance with supersymmetric vacua"
- 01/07/2016 LPTENS (Soutenance de thèse), "Modularity and Vacua in N=1* supersymmetric gauge theories"
- 10/11/2015 CNAM Paris (RJP), "Do we live in a hologram ?".
- 19/02/2015 LPTHE Jussieu, "Duality and Modularity in Elliptic Integrable Systems".
- 23/05/2014 ENS Paris, "Beyond the Standard Model, an overview".
- 29/01/2014 Student seminar, ENS Paris, "Introduction to string theory".