## **ROBERTO SVALDI: Curriculum Vitae**

# École polytechnique fédérale de Lausanne

EPFL SB MATH MATH-GE MA B1 497 (Bâtiment MA) Station 8 CH-1015 Lausanne, Switzerland

#### Personal data

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### **CURRENT POSITION**

#### Bernoulli Instructor and Marie Curie Fellow.

07/2019-present

École polytechnique fédérale de Lausanne, Institute of Mathematics.

The position of Bernoulli Instructor at EPFL is comparable to a fixed-term Lectureship or to an Assistant Professorship without tenure.

As a Marie Curie Fellow, hosted by the Chair of Algebraic Geometry, I carry out research on my project "Moduli and boundedness problems in Algebraic Geometry".

### **EMPLOYMENT HISTORY**

# University Research Fellow, University of Cambridge,

09/2015-06/2019

Department of Pure Mathematics and Mathematical Statistics.

Visiting Scholar at SISSA during academic year 2016-17.

The University Research Fellowship is comparable to an independent postdoc position.

## Fellow and College Lecturer in Pure Mathematics,

10/2015-06/2019

Churchill College, Cambridge.

Visiting Scholar at SISSA during academic year 2016-17.

## Assegnista di ricerca (Post-Doc), SISSA,

10/2016-09/2017

Area of Mathematics. Group of Geometry and Mathematical Physics.

Supervisor: Prof. Jacopo Stoppa. Funded under ERC Starting Grant no. 307119.

I visited Professor Jacopo Stoppa at SISSA Trieste as part of a collaboration at the interface between birational algebraic geometry and complex geometry focused on the study of Kähler–Einstein metrics on algebraic varieties.

## RESEARCH INTERESTS

Minimal Model Program and its applications.

Birational geometry of Calabi-Yau and Fano varieties with applications to physics.

Boundedness questions in algebraic geometry and their topological implications.

The topology of singularities in algebraic geometry and interactions with physics.

Holomorphic foliations and dynamics on projective varieties.

Toric geometry and toroidal compactifications.

Hyperbolicity questions in algebraic geometry.

# **EDUCATION**

Ph. D. in Mathematics. 09/2010-06/2015

Massachusetts Institute of Technology, Department of Mathematics.

Thesis: "Log geometry and extremal contractions".

Advisor: Prof. J. McKernan.

Laurea Specialistica in Matematica (equivalent of M.S. in Mathematics).

09/2008-05/2010

Universitá degli Studi di Roma 3, Faculty of Sciences.

Thesis: "On the cohomology algebras of compact Kähler manifolds and the Kodaira problem".

Advisor: Prof. L. Caporaso.

Graduated on 05/19/2010, with grade 110/110 cum laude.

Laurea Triennale in Matematica (equivalent of B.S. in Mathematics).

10/2005-09/2008

Universitá degli Studi di Pavia, Faculty of Sciences.

 $The sis: "Riemann's \ singularity \ theorem".$ 

Advisor: Prof. M. D. T. Cornalba.

Graduated on 09/16/2008 with grade 110/110 cum laude.

# AWARDS, FELLOWSHIPS, GRANTS

Scheme 4 Grant, Co-PI, London Mathematical Society, Ref.41916 (£1000),	10/2019
for the visit to King's College London of 02/2020.	
Marie Skłodowska Curie Individual Fellowship, PI, "Boundedness	07/2019-present
and Moduli problems in birational geometry", Grant No.842071 (€191149,44)	
EPSRC Postdoctoral Fellowship, PI, "Moduli and boundedness problems	02/2019
in geometry", EP/S024808/1, rejected in favor of the MSCA Fellowship. (£293505,40)	
Scheme 8 Grant, PI, London Mathematical Society, Ref.81613 (£4000),	06/2017
for the organization of the PhD School of 12/2017.	
Federigo Enriques Prize, 2016, awarded by Unione Matematica Italiana and	03/2017
Fondazione Federigo Enriques (€2000).	
AMS Graduate Student Travel Grant (\$250).	03/2015
Praecis Presidential Fellow, Massachusetts Institute of Technology (\$40000).	09/2010- 05/2011
INdAM scholarship for students of the Laurea Specialistica program,	04/2009- 03/2011
awarded by the National Institute for High Mathematics "F. Severi" (€9000).	
INdAM scholarship for students of the Laurea Triennale program,	01/2006- 12/2008
awarded by the National Institute for High Mathematics "F. Severi" (€12000).	
Scholarship at Collegio Borromeo and University Institute for Higher Studies,	10/2005- 10/2008
Pavia, Italy.	

#### **VISITING POSITIONS**

Visitor at King's College London (Host: C. Spicer).	02/2020
Visitor at University of Bonn (Host: L. Tasin).	10/2018
Visitor at Princeton University (Host: G. Di Cerbo).	03/2018
Visitor at BICMR, Beijing (Host: C. Xu).	10/2017
Visitor at SISSA, Trieste (Host: J. Stoppa).	10/2016- 09/2017
Visitor at IMPA, Rio de Janeiro (Host: J. V. Pereira).	03/2016- 04/2016
Visitor at Mathematics Department, UC San Diego.	02/2015- 06/2015
Visitor at Mathematics Department, Princeton University under the	09/2014- 12/2014
Exchange Scholar Program.	
Visitor at Mathematics Department, UC San Diego.	10/2013- 06/2014
Long term visitor at Universitá di Trento	06/2012-present

## **PUBLICATIONS**

#### **Articles**

1. (joint with G. Codogni, A. Fanelli, L. Tasin), Fano varieties in Mori fibre spaces, Int. Math. Res. Not., Volume 2016, Issue 7: 2026–2067, DOI:10.1093/imrn/rnv173.

- 2. (joint with M. Brown, J. McKernan, H. R. Zong), A geometric characterization of toric varieties, Duke Math. J., Volume 167, Number 5 (2018), 923–968, DOI:10.1215/00127094-2017-0047.
- 3. (joint with A. Fanelli, G. Codogni, and L. Tasin), A note on the fibres of Mori fibre spaces, Eur. J. Math. 4 (2018), no. 3, 859–878, DOI:10.1007/s40879-018-0219-z.
- 4. (joint with J. V. Pereira), Effective algebraic integration in bounded genus, Algebraic Geometry 6 (4) (2019) 454–485, DOI:10.14231/AG-2019-021.
- 5. Hyperbolicity for log canonical pairs and the Cone Theorem, Sel. Math. New Ser. (2019), no.5, paper 67, 23 pp., DOI: 10.1007/s00029-019-0512-9.
- 6. (joint with S. Filipazzi), Invariance of plurigenera and boundedness for generalized pairs, Mat. Contemp. 47 (2020), 114–150, Proceedings of the ICM Satellite "Moduli spaces in Algebraic Geometry and Applications", Campinas, Brazil 2018, DOI: 10.21711/231766362020/rmc476
- 7. (joint with W. Chen, G. Di Cerbo, J. Han, and C. Jiang), Birational boundedness of rationally connected Calabi-Yau threefolds, Adv. Math., 378 (2021), 107541, 32 pp., DOI: 10.1016/j.aim.2020.107541
- 8. (joint with G. Di Cerbo), Birational boundedness of low dimensional elliptic Calabi-Yau varieties with a section, Compos. Math. 157 (2021), no. 8, 1766–1806. DOI: 10.1112/S0010437X2100717X.
- 9. (joint with L. Braun, J. Moraga, S. Filipazzi), The Jordan property for local fundamental groups, accepted for publication at Geometry & Topology, 36 pp., arXiv:2006.01253.
- 10. (joint with C. Spicer), Local and global applications of the Minimal Model Program for co-rank one foliations on threefolds, in print at Journal of the European Mathematical Society, 57 pp., DOI: 10.4171/JEMS/1173.

## **Pre-prints**

- 11. (joint with H. Liu), Rational curves and strictly nef divisors on Calabi–Yau threefolds, submitted, 18 pp., arXiv:2010.12233.
- 12. (joint with S. Filipazzi), On the connectedness principle and dual complexes for generalized pairs, submitted, 48 pp., arXiv:2010.08018.
- 13. (joint with C. Birkar, G. Di Cerbo), Boundedness of elliptic Calabi–Yau varieties with a rational section, submitted, 44 pp., arXiv:2010.09769.
- 14. (joint with C. Spicer) Effective generation for foliated surfaces: results and applications, submitted, 32 pp., arXiv:2104.11540.
- 15. (joint with J. Moraga), A characterization of toric singularities, 57 pp., arXiv:2108.01717.
- 16. (joint with S. Filipazzi, C. Hacon), Boundedness of elliptically fibered Calabi–Yau threefolds, submitted, 49pp, arXiv:2112.01352.

### Surveys

- 17. On the structure of local and global singularities: Shokurov's Conjecture, Proceedings for the Kinosaki algebraic geometry symposium 2017, 12 pages, available electronically on the Kyoto University Research Information Repository.
- 18. Recent progress on the birational geometry of foliations on threefolds, Oberwolfach Reports 17 (2020), no. 2/3, 1002–1006 DOI: 10.4171/OWR/2020/19

# INVITED TALKS

#### **Invited lectures series**

A geometric characterization of toric varieties, BAGS, Université de Loraine.

03/2018

#### Colloquia

The geometry of projective varieties, online talk, SISSA, Trieste.

04/2021

Invited conference talks	
A characterization of toricness, 2021 Workshop on Algebraic Geometry: Generalised Pairs and Applications, online conference, Chinese Academy of Sciences & Tsinghua University.	08/2021
Boundedness of elliptic fibrations, Projective and birational higher dimensional geometry, online conference, Universitá di Tri	04/2021 este
Recent progress on the birational geometry of foliations on threefolds, Algebraic Geometry: Moduli Spaces, Birational Geometry and Derived Aspects, MFO Oberv	07/2020 wolfach.
Minimal Model Program for foliations on threefolds and applications, Geometry and Dynamics of Foliations, online conference, CIRM.	05/2020
Birational boundedness of elliptic Calabi-Yau varieties, Workshop on the geometry of elliptic fibrations & COW Seminar, University of Warwick.	02/2020
A geometric characterization of toric morphisms, From Trento to Geometry and back, Universitá di Trento.	12/2019
Birational boundedness of elliptic Calabi-Yau varieties, Moduli and stability conditions, Leibniz Universitát Hannover.	07/2019
Birational boundedness of elliptic Calabi-Yau varieties, Western Algebraic Geometry Symposium, UC Berkeley.	04/2019
Towards birational boundedness of elliptic Calabi-Yau varieties, short communication Moduli spaces in Algebraic Geometry and applications, ICM Satellite Conference, Campina	07/2018 s.
On the birational boundedness of the bases of elliptically fibered Calabi-Yau manifolds in low dimension, Geometry and Physics of F-theory, BIRS.	01/2018
On the geometry of Calabi-Yau varieties in low dimension, Korean-Italian Meeting on Algebraic Geometry 2018, KIAS, Seoul.	01/2018
Global vs. Local structure of singularities, Kinosaki Algebraic Geometry Conference, Japan.	10/2017
Log birational boundedness of Calabi-Yau pairs, Workshop on Fano varieties and Calabi-Yau varieties, Kobe University.	01/2017
Log birational boundedness of Calabi-Yau pairs, Birational Geometry and Characteristic $p>0$ , CIRM, Marseille.	09/2016
A geometric characterization of toric varieties, Giornate di Geometria Algebrica ed Argomenti Correlati XXIII, Universitá di Catania.	05/2016
Adjoint dimension of foliations, Cambridge–Tokyo Workshop, I, University of Cambridge.	11/2015
Hyperbolicity for log pairs, Postgraduate Conference in Complex Geometry, University of Cambridge.	09/2015
Hyperbolicity for log pairs, Distribution of Rational and Holomorphic Curves in Algebraic Varieties, Birs.	03/2015
A geometric characterization of toric varieties, The Geometry of Algebraic Varieties, AMS Sectional Meeting, Michigan State.	03/2015
A geometric characterization of toric varieties, Geometria e Rappresentazioni nella Capitale, II, Universitá degli Studi Roma 3.	12/2014
Invited seminar talks	
Oberseminar: Algebra, Zahlentheorie und algebraische Geometrie, online talk, Albert-Ludwigs-Universität Freiburg.	07/2021
Algebraic Geometry seminar, online talk, University of Kansas.	04/2021
Algebraic Geometry Seminar, online talk, Université de Bordeaux.	04/2021

Dutch online Algebraic Geometry seminar, online talk, Universiteit van Amsterdam	03/2021
Algebraic Geometry Seminar, online talk, University of Utah.	02/2021
Algebraic Geometry Seminar, online talk, UC San Diego.	01/2021
Iskovskikh Seminar (online), Steklov Mathematical Institute, Moscow.	11/2020
Algebraic Geometry Seminar, online talk, Ohio State University.	11/2020
Algebraic Geometry Seminar, online talk, Max Planck Institute, Bonn.	05/2020
Algebraic Geometry Seminar, University of Princeton.	03/2020
KCL/UCL Geometry seminar, University College London.	02/2020
Seminario di Geometria Algebrica, Universitá di Torino.	03/2019
Edinburgh Geometry Seminar, University of Edinburgh.	03/2019
Séminaire d'homotopie en géométrie algébrique, Université de Toulouse.	01/2019
Oberseminar Algebraische Geometrie, Universität des Saarlandes.	11/2018
Algebraic Geometry Seminar, Max Planck Institute, Bonn.	10/2018
Groups, Arithmetic & Algebraic Geometry Seminar, EPF Lausanne.	09/2018
Seminario di Geometria Algebrica, Universitá di Trento.	05/2018
Geometry and Mathematical Physics seminar, Loughborough University.	05/2018
Warwick Algebraic Geometry Seminar, University of Warwick.	05/2018
Algebraic Geometry Seminar, UC San Diego.	04/2018
Algebraic Geometry Seminar, University of Utah.	04/2018
Algebraic Geometry Seminar, Princeton.	03/2018
Math-Physics Joint Seminar, UPenn.	03/2018
Mathematics-String Theory Seminar, IPMU, Tokyo.	10/2017
Algebraic Geometry Seminar, University of Tokyo.	10/2017
Log birational boundedness of Calabi-Yau pairs, BICMR, Beijing.	10/2017
Algebraic Geometry Seminar, University of Oslo.	04/2017
Seminario di Geometria Algebrica, SISSA, Trieste.	03/2017
Algebraic Geometry Seminar, University of Cambridge	03/2017
Algebraic Geometry Seminar, University of Tokyo.	01/2017
Groups, Arithmetic & Algebraic Geometry Seminar, EPFL.	11/2016
Algebraic Geometry Seminar, UC San Diego.	11/2016
Seminario de Álgebra, IMPA, Rio de Janeiro.	03/2016
Algebraic Geometry Seminar, Princeton University.	03/2016
Algebraic Geometry Seminar, Columbia University.	03/2016
Geometry and Mathematical Physics seminar, Loughborough University.	02/2016
EDGE Seminar, University of Edinburgh.	01/2016
Geometry and Topology Seminar, Imperial College.	11/2015
Algebraic Geometry Seminar, University of Cambridge.	11/2015
Seminario di Geometria Algebrica, Universitá degli Studi di Pavia.	10/2015
CIRGET Seminar, UQAM, Montreal.	03/2015
Algebraic Geometry Seminar, Johns Hopkins University.	02/2015
Algebraic Geometry Seminar, UT Austin.	02/2015
Seminario di Geometria Algebrica, Universitá degli Studi Roma 3.	12/2014

## **Contributed talks**

Hyperbolicity for log pairs, AMS Summer Institute in Algebraic Geometry, Salt Lake City.

07/2015

# **TEACHING**

Spring 2022
Fall 2021
Fall 2020
Fall 2019
Fall 2019
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Lent (Spring) 2018
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Michaelmas (Fall) 2018
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IAP 2015
Summer 2013
IAP 2013
Fall 2012
Spring 2012
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Fall 2011
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Spring 2010
Fall 2009
Spring 2009
Fall 2008

# STUDENT SUPERVISION

# Thesis supervision

**Linus Rösler**, MA Thesis, "The geometry of elliptic fibrations", EPFL. **Anaëlle Pfister**, BA project (equivalent to a bachelor's thesis),

02/2021-09/2021 02/2021-06/2021

"An introduction to toric geometry", EPFL.	
Luca Nyckess, BA project (equivalent to a bachelor's thesis),	02/2020-06/2020
"An introduction to complex manifolds and Hodge Theory", EPFL.	
Simen Moe, Part III essay (equivalent to a master's thesis),	12/2018-05/2019
"An introduction to the Minimal Model Program", University of Cambridge.	
Study projects supervision	
Alberto Smailovic Funcasta, BA semester study project,	02/2022-06/2022
"Introduction to algebraic structures: from groups to modules", EPFL.	
Linus Rösler, MA project (one semester project),	09/2020-12/2020
"Elliptic surfaces in Algebraic Geometry", EPFL.	
Maxime Matthey, MA project (one semester project),	09/2020-12/2020
"Advanced topics in Commutative Algebra: Completions", EPFL.	
Gheehyun Nahm, Study project for an undergraduate student	08/2018-03/2019
on advanced topics in Algebraic Geometry, University of Cambridge.	
Leon Zhang, Direct Reading Program, Supervisor for an undergraduate student	IAP 2015
learning Hodge Theory, MIT.	
Minseon Shin, Direct Reading Program, Supervisor for an undergraduate student	IAP 2013
learning Scheme Theory, MIT.	

# CONFERENCES, SEMINARS AND WORKSHOPS ORGANIZATION

Conferences and workshops	_					
Birational Geometry conference and 2020 meeting of the Swiss Mathematical Society,	$\operatorname{TBD}$					
Originally planned for 2020, the conference was postponed to 2022 due to the pandemic.						
four-day conference, (team of 4), Lausanne, Switzerland.						
Basel-Dijon-EPFL Workshop, two-day workshop, (team of 5), Basel, Switzerland.	11/2021					
Basel-Dijon-EPFL Workshop, two-day workshop, (team of 4), Lausanne, Switzerland.	11/2019					
Cambridge-Tokyo Algebraic Geometry Workshop, III, two-day workshop,						
(team of 4), Cambridge, UK.						
New advances in Fano manifolds, five-day school for Ph.D. students, (team of 4),	12/2017					
Cambridge, UK.						
British Algebraic Geometry, three-day conference, (local organizer), Cambridge, UK,	09/2017					
Cambridge-Tokyo Algebraic Geometry Workshop, II, two-day workshop,	03/2017					
(team of 4), Cambridge, UK.						
MIT-RTG Mirror Symmetry Workshop, five-day workshop, (team of 6), Big Bear Lake, CA.	05/2013					

### **Seminars**

Organizer for the Groups, Arithmetic & Algebraic Geometry Seminar, EPFL.	07/2019-present.
Organizer for the Algebraic Geometry Seminar, University of Cambridge.	10/2017-06/2019.

# **OUTREACH ACTIVITIES**

04/2019

HE+	Masterclass,	Churchill Co	llege,	Cambri	dge								
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I gave a lecture on modern geometry and organized an exercise session for high school students.

Open days, Churchill College, Cambridge 07/2018

 $I\ gave\ a\ lecture\ on\ symmetries\ and\ geometry\ and\ organized\ an\ exercise\ session\ for\ high\ school\ students.$ 

Orientation for high-school students, Liceo Classico "G. Prati", Trento 04/2012 I spoke to high school students about what are the challenges of becoming a maths student starting from a background in humanities.

#### ACADEMIC SERVICES

Referee for academic journals:

Since 2015

Mathematics Research Letter, Michigan Journal of Mathematics,

International Mathematics Research Notices (3x), Mathematische Annalen,

Annali della Scuola Normale Superiore di Pisa, Journal of Algebraic Geometry,

Inventiones Mathematicae, International Journal of Mathematics,

Manuscripta Mathematica, Advances in Mathematics (2x), Transactions of the AMS,

Annales de l'Insitute Fourier, Journal of Differential Geometry, Proceedings of the LMS,

Advances in geometry, Forum Math Pi, Journal of the LMS, Electronic Research Archive.

Referee for conference proceedings (by conference title):

Since 2013

Groups of Automorphisms in Birational and Affine Geometry; Moduli of K-stable Varieties;

Birational geometry, Kähler-Einstein metrics and degenerations.

Referee for grants and fellowships applications submitted to

Since 09/2019

the Engineering and Physical Sciences Research Council, UK (3 grants reviewed).

Reviewer for Zentralblatt and Mathscinet.

Since 2014

Master Thesis committee for Peter Simko, EPFL.

07/2017

Mentor for postgraduate students, Churchill College.

10/2017-06/2019

Mentor for the students of the Institute of Mathematics, EPFL.

11/2020-present

Admission Selection Interviews, Churchill College, Cambridge.

12/2018

Postdoc Selection Committee for the Chair of Algebraic Geometry, EPFL.

02/2021

## **LANGUAGES**

Italian: mother tongue.

English: professional proficiency. French: intermediate level. German: beginner level.

Last update: January 6th, 2022

#### REFERENCES

Prof. James McKernan, FRS
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Prof. Zsolt Patakfalvi Research and teaching reference École polytechnique fédérale de Lausanne EPFL SB MATH CAG MA C3 635 (Bâtiment MA), Station 8 CH-1015 Lausanne, Switzerland +41 21 693 55 20 http://cag.epfl.ch/ zsolt.patakfalvi@epfl.ch