

# Christian Urech

EPFL, SB MATH

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## Employment

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- 2019 - present    **Bernoulli Instructor**, École Polytechnique Fédérale de Lausanne (EPFL)  
*The position of Bernoulli Instructor at EPFL is comparable to a fixed-term Lectureship or to an Assistant Professorship without tenure track.*
- 2018 - 2019      **Research Associate**, Imperial College London  
*funded by the Swiss National Science Foundation*
- 2014 - 2017      **Research Assistant**, University of Basel
- 2010 - 2013      **Teaching Assistant**, University of Basel

## Education

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- 2013 - 2017    **Ph.D. in Mathematics**,  
Cotutelle between the University of Basel and the University of Rennes 1  
awarded *summa cum laude*  
Advisors: Jérémy Blanc and Serge Cantat  
Thesis title: “Subgroups of Cremona groups”  
Time split equally between the two universities.
- 2010 - 2013    **Master of Science in Mathematics**, University of Basel  
Advisor: Hanspeter Kraft
- 2009 - 2010    **Exchange year** at the University of British Columbia, Vancouver, Canada
- 2007 - 2010    **Bachelor of Science in Mathematics**, University of Basel
- 2006            **Matura**, with latin as main subject, Gymnasium Leonhard, Basel

## Research Interests

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Groups of birational transformations and polynomial automorphisms, geometric group theory, CAT(0)-cube complexes, braided Thompson’s groups and their finiteness properties, algebraic dynamics, degree sequences, birational geometry, algebraic groups, classical algebraic geometry.

## Visiting Positions

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11/2021	Visitor at the University of Paris-Saclay (Host: A. Lonjou)
09/2019	Research in pairs at the MFO in Oberwolfach with A. Lonjou and S. Zimmermann
09/2018	Participation in the VAT Simons semester at the IMPAN, Warsaw
04/2018	Visitor at the University of Angers (Host: S. Zimmermann)
01-02/2017	Visitor at the University of Michigan (Hosts: M. Jonsson and I. Dolgachev)
07/2016	Visitor at the University of Ferrara (Host: A. Calabri)

## Publications

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### Published/Accepted Articles

1. A. Liendo, A. Regeta, **C. Urech**, “Characterization of affine surfaces with a torus action by their automorphism groups”, <https://arxiv.org/abs/1805.03991v2>, Ann. Sc. Norm. Sup. Pisa-Cl. Sci., to appear
2. A. Genevois, A. Lonjou, **C. Urech**, “Asymptotically rigid mapping class groups I: Finiteness properties of braided Thompson’s and Houghton’s groups”, <https://arxiv.org/abs/2010.07225>, Geom. Topol., to appear
3. **C. Urech**, S. Zimmermann, “Continuous automorphisms of Cremona groups”, <https://arxiv.org/abs/1909.11050>, Int. J. Math., Vol. 32 (2021), No. 04, 2150019
4. A. Lonjou, **C. Urech**, “Actions of Cremona groups on CAT(0) cube complexes”, <https://arxiv.org/abs/2001.00783>, Duke Math. J. 170(17) (2021), 3703–3743
5. A. Liendo, R. Regeta, **C. Urech**, “On the characterization of Danielewski surfaces by their automorphism groups”, <https://arxiv.org/abs/1905.00423>, Transform. Groups 27 (2022), 181–187
6. **C. Urech**, S. Zimmermann, “A new presentation of the plane Cremona group”, <https://arxiv.org/abs/1802.02735>, Proc. Amer. Math. Soc. 147 (2019), no. 7, 2741–2755.
7. **C. Urech**, “Subgroups of elliptic elements of the Cremona group”, <https://arxiv.org/abs/1802.08485>, J. für Reine Angew. Math. 770 (2021), pp. 27–57
8. **C. Urech**, “Simple groups of birational transformations in dimension two”, <https://arxiv.org/abs/1802.09258>, Comment. Math. Helv. 95 (2020), no. 2, pp. 211–246.
9. **C. Urech**, “On homomorphisms between Cremona groups”, <https://arxiv.org/abs/1603.03294>, Ann. Inst. Fourier, Vol. 68, No. 1 (2018), pp. 53–100.
10. **C. Urech**, “Remarks on the degree growth of birational transformations”, <https://arxiv.org/abs/1606.04822>, Math. Res. Lett., Vol. 25, No. 1 (2018), pp. 291–308.

### Preprints

11. A. Genevois, A. Lonjou, **C. Urech**, “Cremona groups over finite fields, Neretin groups, and non-positively curved cube complexes”, <https://arxiv.org/abs/2110.14605>, submitted
12. A. Genevois, A. Lonjou, **C. Urech**, “Asymptotically rigid mapping class groups II: strand diagrams and nonpositive curvature”, <https://arxiv.org/abs/2110.06721>, submitted

## Other Documents

13. **C. Urech**, “Subgroups of elliptic elements of the plane Cremona group”, in: Oberwolfach Report 28/2018.
14. **C. Urech**, “Subgroups of Cremona groups”, Doctoral Thesis at the University of Basel and the University of Rennes 1.
15. **C. Urech**, “On automorphisms of the affine Cremona group”, Master’s Thesis at the University of Basel.

## Teaching

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### Teaching as a Bernoulli Instructor at EPFL

Fall 2022	MATH 111(pi) Algèbre Linéaire, for engineers, <i>flipped classroom</i>
Spring 2022	MATH 479 Linear Algebraic Groups (graduate), <i>flipped classroom</i>
Spring 2022	MATH 323 Algebraic Topology, <i>flipped classroom</i>
Fall 2021	MATH 111(pi) Algèbre Linéaire, for engineers, <i>flipped classroom</i>
Spring 2021	MATH 479 Linear Algebraic Groups (graduate), <i>online</i>
Spring 2021	MATH 323 Algebraic Topology, <i>online</i>
Fall 2020	MATH 735 Topics in Geometric Group Theory (doctoral), <i>partially online</i>
Fall 2020	MATH 111(e) Algèbre Linéaire, for computer science students, <i>hybrid mode</i>
Spring 2020	MATH 429 Lie Groups (graduate), <i>partially online</i>
Spring 2020	MATH 323 Algebraic Topology, <i>partially online</i>
Fall 2019	MATH 111(e) Algèbre Linéaire, for computer science students, <i>ex cathedra</i>

### Teaching as a Research Associate at Imperial College London

Spring 2019	M3P21 Algebraic Topology, <i>ex cathedra</i>
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### Teaching as a Graduate Student at the University of Basel

I was teaching assistant for the following courses, which included grading weekly homework and holding weekly tutorials:

Fall 2017	Introduction to Probability Theory and Statistics
Spring 2017	Number Theory
Fall 2016	Linear Algebra I
Spring 2015	Projective Curves and Surfaces II (graduate)
Fall 2014	Projective Curves and Surfaces I (graduate)
Fall 2012	Seminar for high school students
Spring 2012	Geometry
Fall 2011	Complex Analysis
Spring 2011	Linear Algebra II
Fall 2010	Real Analysis

### Teaching at the Nesin Math Village

In Summer 2018 I gave the following two courses at the 2018 TMD Undergraduate and Graduate Summer School at the Nesin Math Village, Türkiye:

Summer 2018    Geometric Group Theory  
Summer 2018    Elementary Algebraic Geometry

### Mini Courses (Research Level)

07/2018    **Three lectures on the Cremona group**, Loughborough University, UK  
03/2018    **The Cremona group and its action on an infinite dimensional hyperboloid**,  
mini course consisting of 6 lectures, together with A. Lonjou, HSE Moscow, Russia  
02/2018    **Three lectures on Cremona groups**, Imperial College London, UK

### Supervision and Mentorship

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Fall 2022        **MSc thesis** of Marie Abadie on  $CAT(0)$  cube complexes and finiteness properties of braided Thompson's groups, EPFL.  
Spring 2022     **MSc project** of Marie Abadie on mapping class groups, EPFL.  
Spring 2022     **MSc thesis** of Jeanette Fernandez on the automorphism group of  $\text{Aut}(\mathbb{A}^2)$ , EPFL.  
Fall 2021        **MSc project** of Jeanette Fernandez on Weil's regularization theorem, EPFL.  
Spring 2021     **BSc project** of Amandine Favre on completions in commutative algebra, EPFL.  
Fall 2020        **BSc project** of Valentin Prost on the Dehn-Nielsen-Baehr theorem, EPFL.  
Spring 2021     **BSc project** of Blerton Rashiti on groups and graphs, EPFL.  
Summer 2019    **UROP** (Undergraduate research opportunity) of Peter Whalley on the Lickorish-Wallace theorem, Imperial College London. *Awarded the departmental UROP prize.*  
Summer 2019    **UROP** (Undergraduate research opportunity) of JiaJie Tao on groups acting on trees, Imperial College London.  
Summer 2019    **UROP** (Undergraduate research opportunity) of Thomas Graeff Buhl-Nielsen on the classification of topological surfaces, Imperial College London.

### Oral Contributions to Conferences

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06/2022    **Invited talk**, Birational Geometry Conference, EPFL, Switzerland  
01/2022    **Invited talk**, 11th Swiss-French Workshop in Algebraic Geometry, Charmey, Switzerland  
06/2021    **Invited talk**, Algebraic Geometry in Angers, Université d'Angers, France  
09/2020    **Invited talk**, Journée de la Médaille, Université d'Angers, France  
02/2020    **Invited talk**, Rencontre GEOLIE, Université de Nancy, France  
05/2019    **Poster presentation**, 5th BrAG meeting, Liverpool, UK

- 01/2019 **Invited talk**, 8th Swiss-French Workshop in Algebraic Geometry, Charmey, Switzerland
- 12/2018 **Invited talk**, London–Tokyo Workshop II, Imperial College London
- 10/2018 **Invited talk**, Workshop on Fano Varieties and Automorphisms, Loughborough University, UK
- 03/2018 **Invited mini course** (together with Anne Lonjou), Workshop on Birational Geometry, HSE, Moscow, Russia
- 06/2018 **Invited talk**, Workshop "Subgroups of Cremona Groups", MFO, Germany
- 05/2018 **Contributed talk**, Algebraic Geometry - Mariusz Koras in Memoriam, Institute of Mathematics, Polish Academy of Sciences, Warsaw, Poland
- 03/2018 **Poster presentation**, Young Geometric Group Theory VII, Les Diablerets, Switzerland
- 12/2017 **Invited talk**, Donau-Rhein-Modelltheorie-Seminar, Universität Passau, Germany
- 06/2017 **Invited talk**, Edge Days 2017, University of Edinburgh, UK
- 03/2017 **Invited talk**, Basel - EPFL Meeting, University of Basel, Switzerland
- 10/2016 **Poster presentation**, Affine Geometry, Hyperbolicity, Complex Analysis, International Workshop, Institut Fourier, University of Grenoble, France
- 05/2016 **Invited talk**, ANR Lambda Meeting for PhD-students in Dynamics, University of Rennes 1, France
- 09/2016 **Poster presentation**, Cremona Conference, University of Basel, Switzerland
- 06/2016 **Poster presentation**, New Methods in Birational Geometry, CIMI, Toulouse, France
- 08/2015 **Contributed talk**, School and Workshop on Finite Subgroups of Cremona Groups, Fondazione Bruno Kessler, Trento, Italy
- 06/2015 **Poster presentation**, AMS Summer Institute in Algebraic Geometry, University of Utah, USA
- 07/2014 **Invited talk**, ANR Birpol and Del Duca Meeting, IRMAR, University of Rennes 1, France

## Invited Research Talks in Seminars

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- 03/2022 **Cremona groups over finite fields and Neretin groups**  
Algebra seminar, University of the Basque Country, Bilbao, Spain
- 11/2021 **Actions of Cremona groups on  $CAT(0)$  cube complexes**  
ZAG - Zoom Algebraic Geometry Seminar, online
- 10/2021 **Actions of Cremona groups on  $CAT(0)$  cube complexes**  
Séminaire de groupes et géométrie, University of Geneva, Switzerland
- 10/2020 **Actions of Cremona groups on  $CAT(0)$  cube complexes**  
Group actions seminar, online (<https://gas.cayley.kr/>)
- 02/2020 **Actions des groupes de Cremona sur des complexes cubiques  $CAT(0)$**   
Séminaire "Algèbre et géométries", University of Grenoble, France
- 10/2019 **On continuous automorphisms of Cremona groups**  
Seminar Algebra und Topologie, Universität Basel, Switzerland

- 05/2019 **On the characterization of affine surfaces with a torus action by their automorphism groups**  
Rencontre FIBALGA, Université d'Angers, France
- 01/2019 **Simple subgroups of the plane Cremona group**  
London Geometry and Topology Seminar, Imperial College London, UK
- 12/2018 **Simple subgroups of the plane Cremona group**  
Oberseminar Algebra und Zahlentheorie, Universität zu Köln, Germany
- 12/2018 **Sous-groupes simples du groupe de Cremona**  
Séminaire "Algèbre et géométries", University of Grenoble, France
- 06/2018 **Subgroups of elliptic elements of the plane Cremona group**  
Algebraic Geometry Seminar, Loughborough University, United Kingdom
- 06/2018 **Three lectures on the Cremona group**  
Mini course consisting of three lectures, Loughborough University, UK
- 02/2018 **Three lectures on Cremona groups**  
Mini course consisting of 3 lectures, Imperial College, London, UK
- 05/2018 **Les sous-groupes simples du groupe de Cremona**  
Séminaire de Géométrie algébrique, Université Angers, France
- 11/2017 **Simple subgroups of the Cremona group**  
Algebraic and Complex Geometry Seminar, Université de Strasbourg, France
- 05/2017 **Sous-groupes simples du groupe de Cremona**  
Séminaire Géométrie et Topologie, Université Paul Sabatier, Toulouse, France
- 05/2017 **Simple subgroups of the Cremona group**  
Basel - Dijon algebraic geometry seminar, University of Basel, Switzerland
- 02/2017 **Homomorphisms between Cremona groups**  
Algebraic Geometry Seminar, University of Illinois Chicago, USA
- 01/2017 **Degree sequences of birational transformations**  
Complex Analysis, Dynamics and Geometry Seminar, University of Michigan, USA
- 10/2016 **On homomorphisms between Cremona groups**  
Seminar "Algèbre et géométries", University of Grenoble, France
- 07/2016 **Homomorphisms between groups of birational transformations**  
Geometry Seminar, Università degli Studi di Ferrara, Italy
- 02/2016 **Le groupe de Cremona**  
Graduate student Seminar, University of Toulouse III, France
- 11/2015 **Le groupe de Cremona et l'espace de Picard-Manin**  
Graduate student Seminar, University of Rennes 1, France
- 05/2014 **On Cremona representations**  
Geometry and Algebra Seminar, University of Basel, Switzerland
- 10/2014 **On the Cremona group**  
Graduate student Seminar, University of Basel, Switzerland
- 09/2014 **On the Cremona group**  
Graduate student Seminar, Université de Bourgogne, Dijon, France
- 06/2014 **Sur le groupe de Cremona**  
Graduate student seminar, University of Rennes 1, France

- 11/2013 **The affine Cremona group and its automorphisms**  
Graduate student seminar, University of Rennes 1, France
- 02/2013 **On automorphisms of the affine Cremona group as an abstract group and as an ind-group**  
Geometry and Algebra Seminar, University of Basel, Switzerland

## Colloquia

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- 05/2022 **Cremona groups - what they are and how to study them**  
Mathematical Colloquium, University of Bern, Switzerland

## Grants and Awards

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- 2017 Early Postdoc.mobility Grant, the Swiss National Science Foundation (78 000 CHF)
- 2014 Cotutelles-Grant, State Secretariat for Education, Research and Innovation of Switzerland (10 000 CHF)
- 2013 Grant, Geldner Foundation (21 000 CHF)
- 2013 Grant, Janggen Pöhn Foundation (7 000 CHF)
- 2013 Grant, “Freie Akademische Gesellschaft Basel” (14 000 CHF)
- 2009 Scholarship, Stiftung für Theologische und Philosophische Studien (1 000 CHF)
- 2009 Scholarship, Swiss Study Foundation (4 000 CHF)
- 2008 - 2017 Mentee of the Swiss Study Foundation
- 2007 Novartis Award (2 000 CHF)

## Academic and Community Service

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### Refereeing and Reviewing

- Since 2018 Reviewer for MathSciNet
- Since 2017 Referee for articles in more than 10 different international journals

### Organization of Seminars, Conferences, and Workshops

- Since 09/2018 Co-organizer of the Groups, Arithmetic, and Algebraic Geometry Seminar, EPFL
- 05/2022 Co-organizer of the EPFL-Basel-Dijon meeting at EPFL
- 11/2021 Co-organizer of the EPFL-Basel-Dijon meeting at the University of Basel
- 09/2016 Co-organizer of the Cremona Conference at the University of Basel
- 09/2014 - 09/2017 Founder and Co-organizer of *Bernoulli's Tafelrunde*, the seminar for graduate students in mathematics, University of Basel

### Institutional Responsibilities

- 2016–2017 Assistant Representative in the Faculty Assembly, University of Basel
- 2010–2011 Student Representative of the Mathematics Department, University of Basel

### Outreach Activities

- 11/2016 Poster presentation at the 'Open Day' of the DMI, University of Basel
- 09/2014 Presentation with the title 'Die Cremonagruppe, oder von der Kunst durch Null zu dividieren' at the 'Interdisziplinärer Studientag' of the Swiss Study Foundation

- 01/2013    Project leader for the study week boys@science for 'Swiss Youth in Science' at the University of Basel
- Fall 2012    Co-organization of a weekly seminar for gifted high-school students, University of Basel
- 01/2012    Project leader for the study week boys@science for 'Swiss Youth in Science' at the University of Basel

## Memberships

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- Swiss Mathematical Society
- European Mathematical Society
- Freie Akademische Gesellschaft der Universität Basel
- Alumni of the Swiss Study Foundation

## Languages

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**Swiss German and German:**    native  
**English:**    fluent  
**French:**    fluent