Christian Urech

Steinbühlallee 35
CH-4054 Basel
+41 76 263 41 69 | christian.urech@gmail.com
https://christianurech.github.io | OrcID: 0000-0002-5947-9592

Employment

starting 2024	**Senior Lecturer**, Eidgenössische Technische Hochschule Zürich (ETHZ)
2019 - 2023	**Bernoulli Instructor**, École Polytéchnique 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

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

Groups of birational transformations and polynomial automorphisms, geometric group theory, CAT(0)-cube complexes, asymptotically rigid mapping class groups and their finiteness properties, algebraic dynamics, degree sequences, birational geometry, algebraic groups, classical algebraic geometry.

Visiting Positions

11-12/2023	Senior Scientist at the University of Basel (Host: Jérémy Blanc)
10/2023	Visitor at UPV/EHU Bilbao, Spain (Host: A. Lonjou)

09/2022	Visitor at the University of Paris-Saclay (Hosts: A. Lonjou and S. Zimmermann)
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

Published/Accepted Articles

1. A. Genevois, A. Lonjou, **C. Urech**, " Cremona groups over finite fields, Neretin groups, and nonpositively curved cube complexes", https://arxiv.org/abs/2110.14605, International Mathematics Research Notices, rnad015 (2023).

2. 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. (2023), Vol. XXIV, 249-289

3. 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. 26 (2022) 1385–1434

4. **C. Urech**, S. Zimmermann, "Continuous automorphisms of Cremona groups", https://arxiv.org/abs/1909.11050, Int. J. Math., Vol. 32 (2021), No. 04, 2150019

5. 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

6. 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

7. **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.

8. **C. Urech**, "Subgroups of elliptic elements of the Cremona group", https://arxiv.org/abs/1802.08485, J. fur Reine Angew. Math. 770 (2021), pp. 27–57

9. **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.

10. **C. Urech**, "On homomorphisms between Cremona groups", https://arxiv.org/abs/1603.03294, Ann. Inst. Fourier, Vol. 68, No. 1 (2018), pp. 53-100.

11. **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

12. A. Genevois, A. Lonjou, **C. Urech**, "Asymptotically rigid mapping class groups II: strand diagrams and nonpositive curvature", https://arxiv.org/abs/2110.06721

13. A. Lonjou, P. Przytyzki, **C. Urech**, "Finitely generated subgroups of algebraic elements of plane Cremona groups are bounded", `https://arxiv.org/abs/2307.01334`

14. A. Genevois, A. Lonjou, **C. Urech**, "On a Theorem by Lin and Shinder through the Lens of Median Geometry", `http://arxiv.org/abs/2312.05197`

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.

In Preparation

16. A. Duncan, **C. Urech**, "Representations of finite subgroups of Cremona groups", in preparation.

17. A. Genevois, A. Lonjou, **C. Urech**, "Asymptotically rigid mapping class groups III: Isomorphism Problem and Explicit Presentations", in preparation.

18. J. Fernandez, **C. Urech**, "Automorphisms of the plane Cremona groups", in preparation.

Teaching

Teaching as a Bernoulli Instructor at EPFL

Spring 2023	MATH 479 Linear Algebraic Groups (graduate), *flipped classroom*
Spring 2023	MATH 323 Algebraic Topology, *flipped classroom*
Fall 2022	MATH 111(pi) Algèbre Linéaire, for engineers, *flipped classroom*
Spring 2022	MATH 479 Linear Algebraic Groups (graduate), *flipped classroom*
Spring 2022	MATH 323 Algebraic Topology, *flipped classroom*
Fall 2021	MATH 111(pi) Algèbre Linéaire, for engineers, *flipped classroom*
Spring 2021	MATH 479 Linear Algebraic Groups (graduate), *online*
Spring 2021	MATH 323 Algebraic Topology, *online*
Fall 2020	MATH 735 Topics in Geometric Group Theory (doctoral), together with Marc Troyanov and Yash Lodha, *partially online*
Fall 2020	MATH 111(e) Algèbre Linéaire, for computer science students, *hybrid mode*
Spring 2020	MATH 429 Lie Groups (graduate), *partially online*
Spring 2020	MATH 323 Algebraic Topology, *partially online*
Fall 2019	MATH 111(e) Algèbre Linéaire, for computer science students, *ex cathedra*

Teaching as a Research Associate at Imperial College London

Spring 2019	M3P21 Algebraic Topology, *ex cathedra*

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, Türkye:

Summer 2018	Geometric Group Theory
Summer 2018	Elementary Algebraic Geometry

Mini Courses (Research Level)

05/2023   **Median graphs with applications to Cremona groups**,
mini course together with A. Genevois and A. Lonjou, University of Rennes 1, France

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 together with A. Lonjou, HSE Moscow, Russia

02/2018   **Three lectures on Cremona groups**, Imperial College London, UK

Supervision and Mentorship

Spring 2023	**BSc project** of Céline Berthaud on hyperbolic groups, EPFL.
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 $\mathrm{Aut}(\mathbb{A}^2)$, 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

06/2023   **Invited talk**, AGGITatE 2023: Algebras, Groups, Geometry, Invariants and related Topics, University of Essex, Colchester, UK

05/2023   **Inivited mini course** (together with Anthony Genevois and Anne Lonjou), ERC Groups of Algebraic Transformations Workshop, University of Rennes 1, Rennes, France

01/2023   **Invited talk**, Online Workshop on Geometry, Topology, and their Applications, Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany

12/2022   **Invited talk**, Workshop on Birational Complexity of Algebraic Varieties, Simons Center for Geometry and Physics, Stony Brook, USA

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   **Inivited 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

10/2023   **Asymptotically rigid mapping class groups and cube complexes**
Algebra seminar, University of the Basque Country, Bilbao, Spain

02/2023   **Actions of Cremona groups on CAT(0) cube complexes**
Algebra seminar, Friedrich Schiller University, Jena, Germany

01/2023   **Groupes de Cremona sur des corps finis et groupes de Neretin**
Le Séminaire Virtuel Francophone Groupes et Géométrie, Online

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)**
Seminaire "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**
Seminaire "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

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

Grants and Awards

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

Refereeing and Reviewing

Since 2018	Reviewer for MathSciNet
Since 2017	Referee for articles (for 15 different international journals) and grant proposals.

Organization of Seminars, Conferences, and Workshops

09/2019 - 07/2023	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 Responsibilites

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

- Swiss Mathematical Society

- European Mathematical Society

- Freie Akademische Gesellschaft der Universität Basel

- Alumni of the Swiss Study Foundation

Languages

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