S I M I O N F I L I P

University of Chicago
Department of Mathematics
5734 S University Ave
Chicago, IL 60637

email: sfilip@math.uchicago.edu
web: math.uchicago.edu/~sfilip

Citizenship: Republic of Moldova, Romania

US Permanent Resident

EMPLOYMENT & EDUCATION

Associate Professor 2019 – present

University of Chicago

PostDoc 2016 – 2021

Clay Research Fellow
Institute for Advanced Study (2018–2019)
Harvard University, Junior Fellow (2016–2018)

PhD 2010 – 2016

University of Chicago, Advisor: Alex Eskin

MA 2009 – 2010

University of Cambridge, UK
Part III of the Mathematical Tripos with Distinction

AB 2005 – 2009

Princeton University, AB in Mathematics

PAPERS & PREPRINTS

Published or Accepted

• Asymptotic shifting numbers in triangulated categories (with Y.-W. Fan)
  Advances in Mathematics (2023) vol. 428

• Canonical currents and heights for K3 surfaces (with V. Tosatti)
  arXiv:2103.02095 Cambridge Journal of Mathematics, accepted (2022)

• An introduction to K3 surfaces and their dynamics
  Panoramas et Synthèses (2022) Teichmüller theory and dynamics, 1-43

• Kummer rigidity for K3 surface automorphisms via Ricci-flat metrics (with V. Tosatti)
  American Journal of Mathematics (2021) vol. 143, no. 5, pp. 1431–1462

• On pseudo-Anosov autoequivalences (with Y.-W. Fan, F. Haiden, L. Katzarkov, Y. Liu)
  Advances in Mathematics (2021) vol. 384

• Geometry and dynamics on Riemann and K3 surfaces
  Eur. Math. Soc. Mag. (2021) vol. 119, pp. 17–22

• Counting special Lagrangian fibrations in twistor families of K3 surfaces
  Annales Scientifiques de l’École Normale Supérieure (2020) vol. 53(3), pp. 713–750

• Tropical dynamics of area-preserving maps
  Journal of Modern Dynamics (JMD) (2019) vol. 14, pp. 179–226

• Notes on the Multiplicative Ergodic Theorem
  Ergodic Theory and Dynamical Systems (ETDS) (2019) vol. 39(5), pp. 1153–1189

• Smooth and Rough Positive Currents (with V. Tosatti)
  Annales de l’Institut Fourier (AIF) (2018) vol. 68(7), pp. 2981–2999, J.-P. Demailly Anniversary Volume

• The Algebraic Hull of the Kontsevich–Zorich Cocycle (with A. Eskin and A. Wright)
  Annals of Mathematics (2018) vol. 188, pp. 281–313

• Quaternionic covers and monodromy of the Kontsevich–Zorich cocycle in orthogonal groups (with G. Forni and C. Matheus)
  Journal of the European Mathematical Society (JEMS) (2018) vol. 20, pp. 165–198
• Zero Lyapunov exponents and monodromy of the Kontsevich–Zorich cocycle
  Duke Math Journal (2017) vol. 166, pp. 657–706

• Families of K3 surfaces and Lyapunov exponents
  Israel Journal of Mathematics (2018) vol. 226, pp. 29–69

• On Hölder-continuity of Oseledets subspaces (with V. Araujo and A. Bufetov)
  Journal of the London Mathematical Society (JLMS) (2016) vol. 93, pp. 194–218

• Splitting mixed Hodge structures over affine invariant manifolds
  Annals of Mathematics (2016) vol. 183, pp. 681–713

• Semisimplicity and rigidity of the Kontsevich–Zorich cocycle
  Inventiones Mathematicae (2016) vol. 205, pp. 617–670

Preprints (submitted)

• Gaps in the support of canonical currents on projective K3 surfaces (with V. Tosatti) arXiv:2302.08633

• Translation Surfaces: Dynamics and Hodge Theory pdf

• Uniformization of some weight 3 variations of Hodge structure, Anosov representations, and Lyapunov exponents arXiv:2110.07533

• A cyclotomic family of thin hypergeometric monodromy groups in $\text{Sp}_4(\mathbb{R})$ (with C. Fougeron) arXiv:2106.09181

AWARDS

• EMS Prize (2020) European Mathematical Society

• 1st Dynamical Systems Prize for young mathematicians (2016)
  (now called the Michael Brin Dynamical Systems Prize for young mathematicians)

• Clay Research Fellowship (2016-2021) Clay Mathematics Institute

• Junior Fellowship (2016-2019) Society of Fellows, Harvard University

• NSF Grant DMS-2005470 (2020-2023), DMS-2305394 (2023-2026)

• Graduate School (University of Chicago):
  Harper Dissertation Fellowship (2015) The highest university honor for final year PhD students
  Izaak Wirszup memorial prize (2014) For excellence in research
  Lawrence and Josephine Graves Teaching Prize (2014) For effective and responsible teaching
  McCormick Scholarship (2010-2012) For incoming graduate students

• Before Graduate School:
  University of Cambridge: Trinity College Mathematics Studentship (2009-2010)
  Princeton University: George B. Wood Junior Legacy prize (2009) To a senior in recognition of exceptional achievement during the junior year;
  Andrew H. Brown Prize (2008) Mathematics Department, for exceptional work during the junior year; Shapiro Prize for Academic Excellence (2007) For outstanding work during the sophomore year

SERVICE

| REFEREEING & QUICK OPINION | Inventiones Mathematicae, JAMS, Acta Mathematica, Duke Math Journal, Crelle, GAFA, Geometry & Topology, Compositio Mathematica, IMRN, Journal of Modern Dynamics, Transactions of the AMS, Israel Journal of Math, Journal de l’École Polytechnique, Conformal Geometry & Dynamics, Archiv der Matematik, Experimental Mathematics, New York Journal of Math, SIGMA |
| CONFERENCES | Ergodic geometry, number theory and Margulis legacy: the next generation, 12–15 June 2022, Chicago (US) |
| Workshops | Workshop on Finiteness Theorems in Arithmetic and Dynamics, 17–21 October 2022, Lake Como (Italy) |
Seminar Organization  BiSTRO seminar via Zoom, with C. Mathews, C. McMullen, and M. Möller; Weekly (April 2020 – June 2021) then bimonthly (2022)

Departmental Service  Graduate Admissions (2019-present), Colloquium Committee (2020-present), Junior Hiring (2021-present)

PhD Students  Seung uk Jang (2023, co-advised with A. Eskin), Polina Baron (in progress)

Mentoring  REU at UChicago, research talk for undergraduates, summer 2021; Directed Reading Program (DRP) for undergraduates, UChicago, Winter 2014; Upward Bound Program for high school students, UChicago, Fall 2014; Panelist, “Teaching in the College” workshop, Fall 2014

Grant reviews  ERC (European Union, 2021, 2022), FONDECYT (Chile, 2019)

Teaching

UChicago  Undergraduate: Complex Analysis, Algebraic Geometry, Ordinary Differential Equations, Analysis in $\mathbb{R}^n$, Linear Algebra, Multivariable Calculus, Honors Calculus (Moore’s Method, IBL)

Graduate: Dynamics and Rigidity

Lawrence and Josephine Graves Teaching Prize (2014)

Harvard  Graduate: Dynamics and Rigidity

Invited Talks and Lecture Series

Colloquia
2022  U/Tennessee (via Zoom)
2021  Tata Institute (TIFR) (via Zoom)
2019  UC Berkeley (×2), UChicago, Harvard, Stanford
2018  Northwestern, Caltech, Yale
2017  Univ. of Indiana (Bloomington), Tufts, Rice

Schools and Lecture Series
2022  UIC, Chicago, USA (3 lectures), Geometric Structures (re)United
2019  Beijing, China (8 lectures), Summer School on Modern Dynamics
2018  Grenoble, France (3 lectures), Summer School on Teichmüller theory
2016  ICTP, Trieste, Italy (4 lectures), Summer School on Geometry and Dynamics
2015  CIRM, Luminy, France (3 lectures), Summer School “Flat surfaces”

Ilhabela, Brazil (3 lectures), Summer School “Holomorphic Dynamics”

Conference talks
2023  Ascona, Switzerland, Conference in honor of Ursula Hamenstädt
2021  Oberwolfach, Germany, Workshop “Enumerative Geometry of Surfaces”

European Congress of Mathematics, Prize Winner lecture

ICERM, Providence, USA, Workshop “Computational Aspects of Discrete Subgroups of Lie Groups”

Workshop in Dynamical Systems and Related Topics, Penn State
2020  BIRS workshop (Banff) Arithmetic Dynamics and Connections
2019  MSRI, Holomorphic differentials workshop

Cetraro, Italy, Conference in honor of Yves Benoist

Schloss Elmau, Germany, Simons Symposium: Algebraic, Complex and Arithmetic Dynamics
2018  Fields Institute, Canada, Symposium in memory of Maryam Mirzakhani

Fields Institute, Canada, Translation Surfaces Workshop

Oberwolfach, Germany, Workshop “Flat Surfaces and Algebraic Curves”

UMaryland, Bill Veech Memorial Conference
2017  UMaryland, Maryland Analysis & Geometry Atelier

Stonybrook, Hodge Theory, Moduli & Representation Theory

Stanford, GEAR Senior Retreat
Fields Institute, Canada, Workshop on Algebraic Varieties
CIRM, Luminy, France, Conference “Espace de Teichmüller”

2016
ICERM, Providence, USA, Workshop “Cycles on Moduli Spaces, GIT, and Dynamics”
Paris, France, Conference in honor of G. Margulis, 70 years anniversary
Oaxaca, Mexico, Workshop “Flat Surfaces and Dynamics in Moduli Space”

2015
Oxford, UK, Clay Workshop “Geometry and Dynamics on Moduli Spaces”
CIRM, Luminy, France, Conference “Dynamics and Geometry in Teichmüller Space”
MPIM, Bonn, Germany, Arbeitstagung
Ilhabela, Brazil, Conference “Hyperbolicity in Algebraic Geometry”

2014
Bordeaux, France, Conference “Paroles aux jeunes chercheurs”
Daejong, South Korea, ICM satellite conference “Geometry and Groups”
Oberwolfach, Germany, Workshop “Flat Surfaces and Dynamics on Moduli Space”

2013
ICERM, Providence, USA, Workshop on Geometric Structures in Dynamics
Ventotene, Italy, Conference on Geometric and Analytic Group Theory
Morelia, Mexico, International Conference on Surfaces of Infinite Type

Seminar talks

2023
IHP Paris Séminaire “Surfaces Plates”, IHES Séminaire “Géométrie et groupes discrets”

2022
UChicago Dynamics Seminar

2021
(all via Zoom) Orsay Seminar “Opérateurs de Dirac”, Symplectic Zoominar, U. Saarlandes Saarbrücken
Oberseminar Algebra und Zahlentheorie, Heidelberg Geometry Seminar, Yale Dynamics Seminar,
UChicago Algebraic Geometry Seminar, Tel Aviv University Geometry & Dynamics Seminar

2019
UC Berkeley Differential Geometry Seminar, IHP Paris Séminaire “Surfaces Plates”

2018
Univ. of Maryland Dynamics Seminar, IAS Princeton Informal Dynamics Seminar, IHP Paris Séminaire
“Surfaces Plates”, Harvard Informal Geometry and Dynamics Seminar, Northeastern U. Geometry,
Physics, and Representation Theory Seminar

2017
IAS Princeton Analysis seminar, Indiana U. Geometry & Dynamics seminar, Columbia U. Symplectic
Geometry & Gauge Theory Seminar, IHP Paris Séminaire “Surfaces Plates”, Princeton U. Ergodic
Theory Seminar, IAS Princeton Analysis and Mathematical Physics Seminar, Stonybrook U. Algebraic
Geometry Seminar, Northwestern U. Dynamics Seminar

2016
Boston College Geometry & Topology Seminar, Harvard Informal Geometry and Dynamics Seminar,
Yale Geometry & Topology Seminar, UIUC GEAR Seminar, Harvard/MIT Algebraic Geometry Seminar,
Caltech Geometry & Topology Seminar, Univ. of Michigan Geometry Seminar, Marseille France
Séminaire Teich, Orsay France Geometry, Topology & Dynamics Seminar, Cambridge UK Geometry
and Topology Seminar, IHP Paris Séminaire “Surfaces Plates”, Grenoble France Séminaire d’Algèbre et
Géométries

2015
MSRI Berkeley Homogeneous Dynamics Program seminar, Stanford Algebraic Geometry seminar,
Northwestern U. Dynamical Systems seminar, Harvard Informal Geometry and Dynamics seminar,
Courant NYU Algebraic Geometry seminar, UChicago Number Theory seminar, Penn State Dynamical
Systems seminar

2014
Jussieu Paris France Séminaire de Théorie Ergodique, Grenoble France Séminaire d’Algèbre et Géométries,
Marseille France Séminaire Teich, IHP Paris Séminaire “Surfaces Plates”, Univ. of Maryland Dynamical
Systems seminar

2013
Univ. of Utah Max Dehn seminar, UIUC Ergodic Theory seminar