

LUKE JEFFREYS

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RESEARCH INTERESTS

My research interests lie in the intersection of geometry, topology, group theory and dynamics. Specifically, my work focusses on the areas of Teichmüller theory, mapping class groups, hyperbolic geometry, and low-dimensional dynamics.

POSITIONS

OCT 2020 - PRESENT | UNIVERSITY OF BRISTOL, Heilbronn Research Fellow
Mentor: Viveka Erlandsson

EDUCATION

OCT 2016 - JUL 2020 | UNIVERSITY OF GLASGOW
PhD Mathematics (fully funded by an EPSRC studentship)
Thesis title: *Single-cylinder square-tiled surfaces: constructions and applications*
Supervisors: Vaibhav Gadre and Tara Brendle
Examiners: Maxime Fortier Bourque (internal) and Elise Goujard (external)

SEP 2012 - JUN 2016 | UNIVERSITY OF ST ANDREWS
MMath (Honours) Mathematics First Class

PAPERS AND PREPRINTS

6. *Meanders, hyperelliptic pillowcase covers, and the Johnson filtration*. Submitted, 26 pages. arXiv:2210.11332
5. *New gaps on the Lagrange and Markov spectra*, with Carlos Matheus and Carlos Gustavo Moreira. Submitted, 20 pages. arXiv:2209.12876
4. *Non-planarity of $SL(2, \mathbb{Z})$ -orbits of origamis in $\mathcal{H}(2)$* , with Carlos Matheus. Submitted, 9 pages. arXiv:2107.08786
3. *Statistical hyperbolicity for harmonic measure*, with Aitor Azemar and Vaibhav Gadre. Int. Math. Res. Not. 2022, no. 8, 6289–6309. doi: 10.1093/imrn/rnaa277
2. *Single-cylinder square-tiled surfaces and the ubiquity of ratio-optimising pseudo-Anosovs*. Trans. Amer. Math. Soc. **374** (2021) 5739–5781. doi: 10.1090/tran/8374
1. *Minimally intersecting filling pairs on the punctured surface of genus two*. Topology Appl. **254** (2019) 101–106. doi: 10.1016/j.topol.2018.12.011

HONOURS AND AWARDS

- University of Glasgow William Jack Prize for the best PhD thesis in mathematics 2019/20
- University of Glasgow Jon Nimmo Prize for Teaching Excellence 2021
- University of Glasgow Recognizing Excellence in Teaching (RET) Associate Fellowship
- EPSRC Studentship Oct 2016 - Mar 2020 (fully funded PhD studentship)

TEACHING EXPERIENCE

SEP 2021 - PRESENT | HEILBRONN RESEARCH FELLOW, UNIVERSITY OF BRISTOL
Lectured ‘Topics in Modern Geometry’ a final year/master’s level topics course

SEP 2019 - APR 2020 | GRADUATE TEACHING ASSISTANT, UNIVERSITY OF GLASGOW
Role required separate application and interview, and involved lecturing
Engineering Mathematics ENG 1063 Block 4: Differential Calculus (Lecturer);
Mathematics 1

SEP 2016 - MAR 2019 | TEACHING ASSISTANT, UNIVERSITY OF GLASGOW
Mathematics 1R, 1S, 1Y (Introductory algebra and calculus); 2E: Introduction
to Real Analysis; 2F: Foundations of Pure Mathematics; 3H: Algebra

SUPERVISION

2021 - 2022 | *Supervision of a master’s dissertation*
Student: Sophie Wright, University of Bristol
Title: Square-tiled surfaces and Teichmüller theory

INVITED RESEARCH VISITS

6 FEB - 11 FEB 2022	DAGSTUHL SEMINAR: ‘COMPUTATION AND RECONFIGURATION IN LOW-DIMENSIONAL TOPOLOGICAL SPACES’ Schloss Dagstuhl, Leibniz-Zentrum für Informatik (attended remotely)
15 MAR - 24 APR 2020	‘DYNAMICS: TOPOLOGY AND NUMBERS’ TRIMESTER PROGRAM Hausdorff Research Institute for Mathematics (HIM), Bonn Funding awarded by HIM (Visit cancelled due to COVID-19)
29 JUL - 30 AUG 2019	CENTRE DE MATHÉMATIQUES LAURENT SCHWARTZ ÉCOLE POLYTECHNIQUE, FRANCE Invited by Prof Carlos Matheus (CNRS) Funding awarded by the University of Glasgow College of Science and Engineering Graduate School Mobility Scholarship 2019

RECENT AND UPCOMING SEMINAR/CONFERENCE TALKS

14-16 DEC 2022	<i>tbc</i> WEIHNACHTSWORKSHOP 2022 Universität des Saarlandes, Germany
1 NOV 2022	<i>Spin parities and how to calculate them</i> BRISTOL JUNIOR GEOMETRY SEMINAR (BRIJGES) University of Bristol
6 OCT 2022	<i>On the complement of the Lagrange spectrum in the Markov spectrum</i> PURE MATHEMATICS COLLOQUIUM University of St Andrews
19 JUL 2022	<i>Constructing hyperelliptic pillowcase covers from meanders</i> SPECIAL SESSION ON COMBINATORIAL AND COMPUTATIONAL ASPECTS IN TOPOLOGY AMS-SMF-EMS JOINT INTERNATIONAL MEETING Université de Grenoble-Alpes, Grenoble, France
24 FEB 2022	<i>Non-planarity of $SL(2, \mathbb{Z})$-orbits of origamis in genus two</i> GEOMETRY AND TOPOLOGY ONLINE University of Warwick
14 FEB 2022	<i>Ratio-optimising pseudo-Anosovs in the Johnson filtration</i> DYNAMICS AND GROUP GEOMETRY EARLY RESEARCHERS SEMINAR University of Warwick
13 MAR 2021	<i>Constructions and applications of $[1,1]$-square-tiled surfaces</i> SPECIAL SESSION ON GROUPS, GEOMETRY, AND TOPOLOGY 2021 AMS SPRING SOUTHEASTERN SECTIONAL MEETING Online (formerly Georgia Institute of Technology)
12 MAR 2021	<i>Ratio-optimising pseudo-Anosovs and single-cylinder pillowcase covers</i> GEOMETRY AND TOPOLOGY SEMINAR Columbia University
9 FEB 2021	<i>Meanders, filling pairs and quadratic differentials</i> BRISTOL JUNIOR GEOMETRY SEMINAR (BRIJGES) University of Bristol
20 OCT 2020	<i>The statistical hyperbolicity of Teichmüller space</i> GEOMETRY AND TOPOLOGY SEMINAR University of Bristol
14 FEB 2020	<i>$SL(2, \mathbb{Z})$-orbits of genus two square-tiled surfaces</i> MATHEMATICS AND STATISTICS POSTGRADUATE SEMINAR University of Glasgow
19 JUN 2019	<i>Single-cylinder square-tiled surfaces</i> GÉOMÉTRIE ET DYNAMIQUE DANS LES ESPACES DE MODULES (SÉMINAIRE ‘PLAT’) Institut Henri Poincaré
12 OCT 2018	<i>Filling curves on surfaces from equations in the symmetric group</i> MATHEMATICS AND STATISTICS POSTGRADUATE SEMINAR University of Glasgow

8 OCT 2018	<i>Ubiquity of ratio optimisers</i> GEOMETRY AND TOPOLOGY SEMINAR University of Glasgow
18 JUL 2018	<i>Filling curves on surfaces and equations in the symmetric group</i> POSTGRADUATE GROUP THEORY CONFERENCE 2018 University of St Andrews

RECENT AND UPCOMING SEMINARS/CONFERENCES ATTENDED

19-23 SEP 2022	COMBINATORICS, DYNAMICS AND GEOMETRY ON MODULI SPACES Centre International de Rencontres Mathématiques (CIRM), France
8-9 SEP 2022	HEILBRONN ANNUAL CONFERENCE 2022 University of Bristol
6 AUG 2022	QUOTIENTS OF HIERARCHICALLY HYPERBOLIC GROUPS University of Bristol
18-22 JUL 2022	SPECIAL SESSION ON COMBINATORIAL AND COMPUTATIONAL ASPECTS IN TOPOLOGY AMS-SMF-EMS JOINT INTERNATIONAL MEETING Université de Grenoble-Alpes, Grenoble, France
21 JUN – 2 JULY 2021	CMI-HIMR DYNAMICS AND GEOMETRY ONLINE SUMMER SCHOOL University of Bristol (Online)
7-11 JUN 2021	GEOMETRIC AND ASYMPTOTIC GROUP THEORY WITH APPLICATIONS (GAGTA) 2021 Online
6-9 APR 2021	BMC-BAMC 2021 University of Glasgow (Online)
20-22 JAN 2021	CHALLENGES AND RECENT ADVANCES IN MATHEMATICAL PHYSICS Fry Conference Series, University of Bristol (Online)

SERVICE ACTIVITIES

AUG 2021 - PRESENT	<i>Co-Organiser of the</i> GEOMETRY AND TOPOLOGY SEMINAR University of Bristol
2020 - PRESENT	<i>Referee for</i> Topology and its Applications, Journal of Knot Theory and Its Ramifications, <i>and</i> Journal of the European Mathematical Society
NOV 2020	<i>LMS Newsletter Microthesis</i> Single-Cylinder Square-Tiled Surfaces, LMS Newsletter, Issue: 491 - November 2020, pp. 36-37
31 JAN 2020	<i>Submitted code to the</i> <code>surface_dynamics</code> <i>package of the</i> SageMath <i>software</i>
15 NOV 2019	<i>Outreach at</i> STEMFEST'19 Glasgow Science Centre
2017 - 2018	<i>Co-Organiser of the</i> MATHEMATICS AND STATISTICS POSTGRADUATE SEMINAR University of Glasgow

REFEREES

DR VAIBHAV GADRE	UNIVERSITY OF GLASGOW	vaibhav.gadre@glasgow.ac.uk
DR VIVEKA ERLANDSSON	UNIVERSITY OF BRISTOL	v.erlandsson@bristol.ac.uk
PROF CARLOS MATHEUS	CMLS ÉCOLE POLYTECHNIQUE	carlos.matheus@math.cnrs.fr
PROF CHRISTOPHER LEININGER	RICE UNIVERSITY	cjl12@rice.edu
DR THOMAS JORDAN (TEACHING)	UNIVERSITY OF BRISTOL	thomas.jordan@bristol.ac.uk