

VOLUME 155 NUMBER 12 DECEMBER 2019

ISSN 0010-437X (print)
ISSN 1570-5846 (online)

COMPOSITIO MATHEMATICA



FOUNDATION COMPOSITIO MATHEMATICA

London Mathematical Society



COMPOSITIO MATHEMATICA

www.compositio.nl

Managing Editors:

J. Heinloth, *Universität Duisburg-Essen, Fakultät für Mathematik, D-45117 Essen, Germany*

B. Klingler, *Humboldt-Universität zu Berlin, Institut für Mathematik, Unter den Linden 6,
DE-10099 Berlin, Germany*

L. Taelman, *Korteweg-de Vries Institute, University of Amsterdam, P.O. Box 94248,
NL-1090 GE Amsterdam, The Netherlands*

E. Vasserot, *Université Paris Diderot, IMJ-PRG, Bâtiment Sophie Germain, 8 place Aurélie Nemours,
FR-75013 Paris, France*

Editorial Board:

A. A. Beilinson, *University of Chicago, IL, USA*; **P. Biran**, *ETH Zürich, Switzerland*; **C. Breuil**, *Université Paris-Sud, Orsay, France*; **D. Calegari**, *University of Chicago, IL, USA*; **J.-H. Evertse**, *University of Leiden, The Netherlands*; **G. Faltings**, *Max-Planck-Institut für Mathematik, Bonn, Germany*; **D. Gaitsgory**, *Harvard University, Cambridge, MA, USA*; **J.-M. Hwang**, *Korea Institute for Advanced Study, Seoul, Korea*; **B. Kleiner**, *Courant Institute of Mathematical Sciences, NY, USA*; **M. Kontsevich**, *Institut des Hautes Études Scientifiques, Bures-sur-Yvette, France*; **Wen-Wei Li**, *Chinese Academy of Sciences, Beijing, PR China*; **C. Manolescu**, *Stanford University, CA, USA*; **M. Mustață**, *University of Michigan, Ann Arbor, MI, USA*; **B. C. Ngô**, *University of Chicago, IL, USA*; **C. W. Rezk**, *University of Illinois, Urbana-Champaign, IL, USA*; **P. Sarnak**, *Princeton University, NJ, USA*; **P. Scholze**, *Universität Bonn, Germany*; **B. Siebert**, *Universität Hamburg, Germany*; **S. Vaes**, *KU Leuven, Belgium*; **C. Voisin**, *Université Pierre et Marie Curie, Paris, France*; **A. Wilkinson**, *University of Chicago, IL, USA*; **T. D. Wooley**, *Purdue University, IN, USA*.

Aims and Scope. The aim of *Compositio Mathematica* is to publish first-class mathematical research papers. By tradition the journal focuses on papers in the mainstream of pure mathematics. This includes the fields of algebra, number theory, topology, algebraic and differential geometry and (geometric) analysis. Papers on other topics are welcome if they are of interest not only to specialists. All contributions are required to meet high standards of quality and originality and are carefully screened by experts in the field.

Compositio Mathematica (ISSN 0010-437X) is published monthly as one annual volume of twelve parts by the London Mathematical Society and distributed by Cambridge University Press, Journals Fulfilment Department, UPH, Shaftesbury Road, Cambridge CB2 8BS, UK / Cambridge University Press, 1 Liberty Plaza, Floor 20, New York, NY 10006, USA. Periodicals postage paid at New York, NY and additional mailing offices. POSTMASTER: send address changes in the USA and Canada to *Compositio Mathematica*, Cambridge University Press, 1 Liberty Plaza, Floor 20, New York, NY 10006, USA.

Subscriptions. The annual subscription rate for 2019 is €1550/£1199 (USA, Canada and Mexico US\$1920). These prices include delivery by air and access to an online version. Single issues cost €149/£115 (USA, Canada and Mexico US\$184) plus postage.

Orders, which must be accompanied by payment, may be sent to any bookseller or subscription agent, or direct to Cambridge University Press at the UK address above, or in the USA, Canada or Mexico to Journals Fulfillment Department, 1 Liberty Plaza, Floor 20, New York, NY 10006, USA. EU subscribers (outside the UK) who are not registered for VAT should add VAT at their country's rate. VAT-registered subscribers should provide their VAT registration number. Japanese prices for institutions are available from Kinokuniya Company Ltd, PO Box 55, Chitose, Tokyo 156, Japan.

© Foundation Compositio Mathematica. All rights reserved; no part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of the Publishers or a licence permitting restricted copying in the UK by the Copyright Licensing Agency Ltd, 90 Tottenham Court Road, London W1P 9HE, or in the USA by the Copyright Clearance Center Inc., 222 Rosewood Drive, Danvers, MA 01923. Organizations in the USA that are registered with the C.C.C. may therefore copy material beyond the limits permitted by sections 107 and 108 of US copyright law subject to payment to C.C.C. of the per-copy fee. This consent does not extend to multiple copying for promotional and commercial purposes. Code 0010-437X/2019.

Individual readers of this publication, and non-profit libraries acting for them, are permitted to make fair use of the material, such as to make a single copy of one article for use in teaching or research. Permission is also granted to quote brief passages from this publication in reviews, provided that the customary acknowledgement of the source is given.



COMPOSITIO MATHEMATICA

VOLUME 155 NUMBER 12 DECEMBER 2019

- Tomoyuki Arakawa** and **Edward Frenkel** Quantum Langlands duality of representations of \mathcal{W} -algebras 2235–2262
- Masaki Kashiwara** and **Myungho Kim** Laurent phenomenon and simple modules of quiver Hecke algebras 2263–2295
- Pierre-Emmanuel Caprace** and **Adrien Le Boudec** Bounding the covolume of lattices in products 2296–2333
- Qing Lu** and **Weizhe Zheng** Compatible systems and ramification 2334–2353
- Michael Magee** On Selberg's eigenvalue conjecture for moduli spaces of abelian differentials 2354–2398
- Vlerë Mehmeti** Patching over Berkovich curves and quadratic forms 2399–2438

