
VOLUME 35

NUMBER 3

JULY 2022

JOURNAL

OF THE

ISSN 0894-0347 (print)
ISSN 1088-6834 (online)

A M E R I C A N M A T H E M A T I C A L S O C I E T Y

EDITORS

Laura G. DeMarco
Simon Donaldson
Pavel Etingof
Michael J. Larsen
Sylvia Serfaty
Richard Taylor
Shmuel Weinberger

ASSOCIATE EDITORS

Mohammed Abouzaid
Ian Agol
Jian Ding
Dmitry Dolgopyat
Lawrence Guth
Ursula Hamenstadt
Lars Hesselholt
Richard Kenyon
Bruce A. Kleiner
Thomas Fun Yau Lam
Ciprian Manolescu
Lillian Pierce
Anand Pillay
Peter Scholze
Amit Singer
Gigliola Staffilani
Benjamin Sudakov
Ulrike Tillmann
Burt Totaro
Melanie Matchett Wood
Zhiwei Yun



AMERICAN
MATHEMATICAL
SOCIETY

Providence, Rhode Island USA

Journal of the American Mathematical Society

This journal is devoted to research articles of the highest quality in all areas of pure and applied mathematics.

Submission information. See **Information for Authors** at the end of this issue.

Publication on the AMS website. Articles are published on the AMS website individually after proof is returned from authors and before appearing in an issue.

Subscription information. The *Journal of the American Mathematical Society* is published quarterly and is also accessible electronically from www.ams.org/journals/. Subscription prices for Volume 35 (2022) are as follows: for paper delivery, US\$462 list, US\$369.60 institutional member, US\$415.80 corporate member, US\$277.20 individual member; for electronic delivery, US\$407 list, US\$325.60 institutional member, US\$366.30 corporate member, US\$244.20 individual member. Upon request, subscribers to paper delivery of this journal are also entitled to receive electronic delivery. If ordering the paper version, add US\$5.00 for delivery within the United States; US\$16 for surface delivery outside the United States. Subscription renewals are subject to late fees. See www.ams.org/journal-faq for more journal subscription information.

Back number information. For back issues see www.ams.org/backvols.

Subscriptions and orders should be addressed to the American Mathematical Society, P.O. Box 845904, Boston, MA 02284-5904 USA. *All orders must be accompanied by payment.* Other correspondence should be addressed to 201 Charles Street, Providence, RI 02904-2213 USA.

Copying and reprinting. Individual readers of this publication, and nonprofit libraries acting for them, are permitted to make fair use of the material, such as to copy an article for use in teaching or research. Permission is granted to quote brief passages from this publication in reviews, provided the customary acknowledgment of the source is given.

Republication, systematic copying, or multiple reproduction of any material in this publication is permitted only under license from the American Mathematical Society. Requests for permission to reuse portions of AMS publication content are handled by the Copyright Clearance Center. For more information, please visit www.ams.org/publications/pubpermissions.

Excluded from these provisions is material for which the author holds copyright. In such cases, requests for permission to reuse or reprint material should be addressed directly to the author(s). Copyright ownership is indicated in the notice in the lower right-hand corner of the first page of each article.

The *Journal of the American Mathematical Society* (ISSN 0894-0347 (print); ISSN 1088-6834 (online)) is published quarterly by the American Mathematical Society at 201 Charles Street, Providence, RI 02904-2213 USA and is mailed from Providence, Rhode Island. Periodicals postage is paid at Providence, Rhode Island. Postmaster: Send address changes to Journal of the AMS, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2213 USA.

© 2022 by the American Mathematical Society. All rights reserved.

This journal is indexed in *Mathematical Reviews*, *Zentralblatt MATH*, *Science Citation Index*[®], *Science Citation Index*TM-*Expanded*, *ISI Alerting Services*SM, *CompuMath Citation Index*[®], and *Current Contents*[®]/*Physical, Chemical & Earth Sciences*. This journal is archived in *Portico* and in *CLOCKSS*.

Printed in the United States of America.

⊗ The paper used in this journal is acid-free and falls within the guidelines established to ensure permanence and durability.

10 9 8 7 6 5 4 3 2 1 27 26 25 24 23 22

JOURNAL OF THE AMERICAN MATHEMATICAL SOCIETY
CONTENTS

Vol. 35, No. 3

July 2022

Cyril Imbert and Luis Enrique Silvestre, Global regularity estimates for the Boltzmann equation without cut-off	625
Chao Li and Wei Zhang, Kudla–Rapoport cycles and derivatives of local densities	705
Yiannis Sakellaridis and Jonathan Wang, Intersection complexes and unramified L-factors	799
Mark Andrea de Cataldo, Daveshe Maulik, and Junliang Shen, Hitchin fibrations, abelian surfaces, and the P=W conjecture	911

Editors

Laura G. DeMarco
Department of Mathematics
Northwestern University
Evanston, IL 60208-2730 USA
demarco@northwestern.edu

Simon Donaldson
Simons Center for Geometry and Physics
Stony Brook University
Stony Brook, NY 11794 USA
sdonaldson@scgp.stonybrook.edu

Pavel Etingof
Department of Mathematics
Massachusetts Institute of Technology
77 Massachusetts Avenue
Cambridge, MA 02139 USA
etingof@math.mit.edu

Michael J. Larsen
Indiana University
Department of Mathematics
831 E 3rd Street
Bloomington, IN 47405 USA
mjlarsen@indiana.edu

Sylvia Serfaty
New York University-Courant Institute
251 Mercer Street
New York, NY 10012-1185 USA
serfaty@cims.nyu.edu

Richard Taylor
Stanford University
Building 380
450 Jane Stanford Way
Stanford, CA 94305 USA
rftaylor@stanford.edu

Shmuel Weinberger
Department of Mathematics
University of Chicago
5734 S University Avenue
Chicago, IL 60637 USA
shmuel@math.uchicago.edu

Associate Editors

Mohammed Abouzaid, Columbia University
Ian Agol, University of California, Berkeley
Jian Ding, Peking University
Dmitry Dolgopyat, University of Maryland
Lawrence Guth, Massachusetts Institute of Technology
Ursula Hamenstadt, University of Bonn
Lars Hesselholt, Nagoya University
Richard Kenyon, Yale University
Bruce A. Kleiner, New York University-Courant Institute
Thomas Fun Yau Lam, University of Michigan
Ciprian Manolescu, Stanford University
Lillian Pierce, Duke University
Anand Pillay, University of Notre Dame
Peter Scholze, Universität Bonn
Amit Singer, Princeton University
Gigliola Staffilani, Massachusetts Institute of Technology
Benjamin Sudakov, ETH Zürich
Ulrike Tillmann, University of Oxford
Burt Totaro, University of California, Los Angeles
Melanie Matchett Wood, Harvard University
Zhiwei Yun, Massachusetts Institute of Technology

Editorial Information

Information on the backlog for this journal can be found on the AMS website starting from <http://www.ams.org/jams>.

In an effort to make articles available as quickly as possible, articles are electronically published on the AMS website individually after proof is returned from authors and before appearing in an issue.

A Consent to Publish is required before we can begin processing your paper. After a paper is accepted for publication, the Providence office will send a Consent to Publish and Copyright Agreement to all authors of the paper. By submitting a paper to this journal, authors certify that the manuscript has not been submitted to nor is it under consideration for publication by another journal, conference proceedings, or similar publication.

Information for Authors

Initial submission. All articles submitted to this journal are peer-reviewed. The AMS has a single blind peer-review process in which the reviewers know who the authors of the manuscript are, but the authors do not have access to the information on who the peer reviewers are. The AMS uses Centralized Manuscript Processing for initial submission. Authors should submit a PDF file using the Initial Manuscript Submission form found at www.ams.org/submission/jams or should send one copy of the manuscript to the following address: Centralized Manuscript Processing, JOURNAL OF THE AMS, 201 Charles Street, Providence, RI 02904-2213 USA. If a paper copy is being forwarded to the AMS, indicate that it is for the *Journal of the AMS* and include the name of the corresponding author, contact information such as email address or mailing address, and the name of an appropriate Editor to review the paper (see the list of Editors above).

The first page must contain a *descriptive title* that is short, but informative; useless or vague phrases such as “some remarks about” or “concerning” should be avoided. Although an abstract is not required upon initial submission, upon acceptance authors will be requested to supply an abstract for the electronic version of this journal. The AMS offers free worldwide access to the electronic abstracts. An abstract should be at least one complete sentence and at most 300 words. No abstracts appear in the printed journal starting in 1998. Included with the footnotes to the paper should be the 2010 *Mathematics Subject Classification* representing the primary and secondary subjects of the article. The classifications are accessible from www.ams.org/msc/. The Mathematics Subject Classification footnote may be followed by a list of *key words and phrases* describing the subject matter of the article and taken from it. Journal abbreviations used in bibliographies are listed in the latest *Mathematical Reviews* annual index. The series abbreviations are also accessible from www.ams.org/msnhtml/serials.pdf. To help in preparing and verifying references, the AMS offers MR Lookup, a Reference Tool for Linking, at www.ams.org/mrlookup/.

Electronically prepared manuscripts. Manuscripts should be electronically prepared in $\mathcal{A}\mathcal{M}\mathcal{S}\text{-}\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$. To this end, the Society has prepared $\mathcal{A}\mathcal{M}\mathcal{S}\text{-}\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$ author packages for each AMS publication. Author packages include instructions for preparing electronic manuscripts, samples, and a style file that generates the particular design specifications of that publication series. Articles properly prepared using the $\mathcal{A}\mathcal{M}\mathcal{S}\text{-}\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$ style file and the `\label` and `\ref` commands automatically enable extensive intra-document linking to the bibliography and other elements of the article for searching electronically on the Web.

Authors may retrieve an author package for *Journal of the AMS* starting from www.ams.org/jams/jamsauthorpac.html. The *AMS Author Handbook* is available in PDF format from the author package link. The author package can also be obtained free of charge by sending email to tech-support@ams.org or from the Publication Division, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2213 USA. When requesting an author package, please specify the publication in which your paper will appear. Please be sure to include your complete email address.

After acceptance. The source files for the final version of the electronic manuscript should be sent to the Providence office immediately after the paper has been accepted for publication. The author should also submit a PDF of the final version of the paper to the

Editor, who will forward a copy to the Providence office. Accepted electronically prepared manuscripts can be submitted via the Web at www.ams.org/submit-book-journal/, sent via email to pub-submit@ams.org, or sent on CD to the Electronic Prepress Department, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2213 USA. When sending a manuscript electronically via email or CD, please be sure to include a message indicating in which publication the paper has been accepted. Complete instructions on how to send files are included in the author package.

Electronic graphics. Comprehensive instructions on preparing graphics are available from www.ams.org/authors/journals.html. A few of the major requirements are given here.

Submit files for graphics as EPS (Encapsulated PostScript) files. This includes graphics originated via a graphics application as well as scanned photographs or other computer-generated images. If this is not possible, TIFF files are acceptable as long as they can be opened in Adobe Photoshop or Illustrator.

Authors using graphics packages for the creation of electronic art should also avoid the use of any lines thinner than 0.5 points in width. Many graphics packages allow the user to specify a “hairline” for a very thin line. Hairlines often look acceptable when proofed on a typical laser printer. However, when produced on a high-resolution laser imagesetter, hairlines become nearly invisible and will be lost entirely in the final printing process.

Screens should be set to values between 15% and 85%. Screens which fall outside of this range are too light or too dark to print correctly. Variations of screens within a graphic should be no less than 10%.

Any graphics created in color will be rendered in grayscale for the printed version unless color printing is authorized by the Managing Editor and the Publisher. In general, color graphics will appear in color in the online version.

AMS policy on making changes to articles after publication. Articles are published on the AMS website individually after proof is returned from authors and before appearing in an issue. To preserve the integrity of electronically published articles, once an article is individually published to the AMS website, changes cannot be made in place in the paper. The AMS does not keep author-related information such as affiliation, current address, and email address up to date after a paper is electronically published.

Corrections of critical errors may be made to the paper by submitting an errata article to the Editor. The errata article will be published electronically, will appear in a future print issue, and will link back and forth on the Web with the original article.

Secure manuscript tracking on the Web. Authors can track their manuscripts through the AMS journal production process using the personal AMS ID and Article ID printed in the upper right-hand corner of the Consent to Publish form sent to each author who publishes in AMS journals. Access to the tracking system is available from www.ams.org/mstrack/. An explanation of each production step is provided on the Web through links from the manuscript tracking screen. Questions can be sent to jams-query@ams.org.

Inquiries. Any inquiries concerning a paper that has been accepted for publication that cannot be answered via the manuscript tracking system mentioned above should be sent to jams-query@ams.org or directly to the Electronic Prepress Department, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2213 USA.

JOURNAL OF THE AMERICAN MATHEMATICAL SOCIETY
CONTENTS

Vol. 35, No. 3

July 2022

Cyril Imbert and Luis Enrique Silvestre, Global regularity estimates for the Boltzmann equation without cut-off	625
Chao Li and Wei Zhang, Kudla–Rapoport cycles and derivatives of local densities	705
Yiannis Sakellaridis and Jonathan Wang, Intersection complexes and unramified L-factors	799
Mark Andrea de Cataldo, Daveshe Maulik, and Junliang Shen, Hitchin fibrations, abelian surfaces, and the P=W conjecture	911

Journal of the American Mathematical Society

VOLUME 35 NUMBER 3 PAGES 625–954 JULY 2022



0894-0347(202207)35:3;1-9

