Steven Hurder and Olga Lukina, Wild solenoids ........................................ 4493
Alexander Kleshchev and Robert Muth, Affine zigzag algebras and imaginary strata for KLR algebras ................................................................. 4535
Corentin Perret-Gentil, Distribution questions for trace functions with values in cyclotomic integers and their reductions ........................................ 4585
Chao Li, 2-Selmer groups, 2-class groups and rational points on elliptic curves ........................................................................................................ 4631
Jaehoon Kim, Daniela Kühn, Deryk Osthus, and Mykhaylo Tyomkyn, A blow-up lemma for approximate decompositions ........ 4655
Victor Vilaça Da Rocha, Modified scattering and beating effect for coupled Schrödinger systems on product spaces with small initial data .... 4743
Oran Gannot, The null-geodesic flow near horizons ............ 4769
Eliaj Liflyand and Akihiko Miyachi, Boundedness of multidimensional Hausdorff operators in $H^p$ spaces, $0 < p < 1$ ....................... 4793
Brian Lehmann, Iitaka dimension for cycles ......................... 4815
Alex Amenta, Emiel Lorist, and Mark Veraar, Fourier multipliers in Banach function spaces with UMD concavifications ....................... 4837
A. Yu. Olshanskii and M. V. Sapir, On flat submaps of maps of nonpositive curvature ............................................................... 4869
Thomas Murphy and Paul-Andi Nagy, Complex Riemannian foliations of open Kähler manifolds ................................................................. 4895
Shantanu Dave and Stefan Haller, On 5-manifolds admitting rank two distributions of Cartan type .............................................................. 4911
Ricardo A. E. Mendes and Marco Radeschi, A slice theorem for singular Riemannian foliations, with applications ........................................ 4931
Yonatan Gutman, Freddie Manners, and Péter P. Varjú, The structure theory of Nilspaces II: Representation as nilmanifolds ...... 4951
Yuki Hirano, Relative singular locus and Balmer spectrum of matrix factorizations .......................................................... 4993
Aeryeong Seo, A Kobayashi pseudo-distance for holomorphic bracket generating distributions ...................................................... 5023
Sean Cox and Monroe Eskew, Strongly proper forcing and some problems of Foreman ........................................................... 5039
Darren C. Ong and Christian Remling, Generalized Toda flows ...... 5069
Fabio Cavalletti, Marc Sedjro, and Michael Westdickenberg, A variational time discretization for compressible Euler equations ..... 5083
Jorge Hounie and Giuliano Zugliani, Global solvability of real analytic involutive systems on compact manifolds. Part 2 .......... 5157
Dana Mendelson, Andrea R. Nahmod, Nataša Pavlović, and Gigliola Staffilani, An infinite sequence of conserved quantities for the cubic Gross–Pitaevskii hierarchy on $\mathbb{R}$ ........................................... 5179
Tobias Kaiser and Patrick Speissegger, Analytic continuations of log-exp-analytic germs .......................................................... 5203
Editorial Information

To be published in the Transactions, a paper must be correct, new, nontrivial, and significant. Further, it must be well written and of interest to a substantial number of mathematicians. Piecemeal results, such as an inconclusive step toward an unproved major theorem or a minor variation on a known result, are in general not acceptable for publication.

Papers submitted to the Transactions should be 15 or more published journal pages in length. Shorter papers may be submitted to the Proceedings of the American Mathematical Society. Published pages are the same size as those generated in the style files provided for \texttt{AMSLaTeX}.

Information on the backlog for this journal can be found on the AMS website starting from \url{http://www.ams.org/tran}.

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 to all authors of the paper. By submitting a paper to this journal, authors certify that the results have not been submitted to nor are they 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 reviewers are. The AMS uses Centralized Manuscript Processing for initial submissions. Authors should submit a PDF file using the Initial Manuscript Submission form found at \url{www.ams.org/submission/tran}, or send one copy of the manuscript to the following address: Centralized Manuscript Processing, TRANSACTIONS 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 Transactions 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 below).

The first page of an article must consist of a descriptive title, followed by an abstract that summarizes the article in language suitable for workers in the general field (algebra, analysis, etc.). The descriptive title should be short, but informative; useless or vague phrases such as “some remarks about” or “concerning” should be avoided. The abstract should be at least one complete sentence, and at most 300 words. Included with the footnotes to the paper should be the 2010 \texttt{Mathematics Subject Classification} representing the primary and secondary subjects of the article. The classifications are accessible from \url{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 \textit{Mathematical Reviews} annual index. The series abbreviations are also accessible from \url{www.ams.org/msnhtml/serials.pdf}. To help in preparing and verifying references, the AMS offers MR Lookup, a Reference Tool for Linking, at \url{www.ams.org/mrlookup/}.

Electronically prepared manuscripts. Manuscripts should be electronically prepared in \texttt{AMSLaTeX}. To this end, the Society has prepared \texttt{AMSLaTeX} 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 \texttt{AMSLaTeX} style file and the \texttt{\LaTeX} 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 Transactions of the AMS from \url{www.ams.org/tran/tranauthorpac.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 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 starting 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 tran-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 tran-query@ams.org or directly to the Electronic Prepress Department, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2213 USA.
Editors

The AMS uses Centralized Manuscript Processing for initial submissions to AMS journals. Authors should follow instructions listed on the Initial Submission page found at www.ams.org/tran/transubmit.html.

Managing Editor: Alejandro Adem, Department of Mathematics, University of British Columbia, Room 121, 1984 Mathematics Road, Vancouver, British Columbia V6T 1Z2, Canada; e-mail: transactions@math.ubc.ca

1. GEOMETRY, TOPOLOGY & LOGIC
   Coordinating Editor: Richard Canary, Department of Mathematics, University of Michigan, Ann Arbor, MI 48109-1043 USA; e-mail: canary@umich.edu
   
   Algebraic topology, Michael Hill, Department of Mathematics, University of California Los Angeles, Los Angeles, CA 90095 USA; e-mail: mikehill@math.ucla.edu
   
   Differential geometry, Chiu-Chu Melissa Liu, Department of Mathematics, Columbia University, New York, NY 10027 USA; e-mail: ccliu@math.columbia.edu
   
   Logic, Noam Greenberg, School of Mathematics and Statistics, Victoria University of Wellington, Wellington 6140, New Zealand; e-mail: greenberg@msor.vuw.ac.nz
   
   Low-dimensional topology and geometric structures, Richard Canary

2. ALGEBRA AND NUMBER THEORY
   Coordinating Editor: Henri Darmon, Department of Mathematics, McGill University, Montreal, Quebec H3A 0G4, Canada; e-mail: darmon@math.mcgill.ca
   
   Algebra, Michael Larsen, Department of Mathematics, Rawles Hall, Indiana University, 831 E 3rd St., Bloomington, IN 47405 USA; e-mail: mlarsen@indiana.edu
   
   Algebraic geometry, Lucia Caporaso, Department of Mathematics and Physics, Roma Tre University, Largo San Leonardo Murialdo, I-00146 Rome, Italy; e-mail: LCedit@mat.uniroma3.it
   
   Arithmetic geometry, Ted C. Chinburg, Department of Mathematics, University of Pennsylvania, Philadelphia, PA 19104-6395 USA; e-mail: ted@math.upenn.edu
   
   Commutative algebra, Irena Peeva, Department of Mathematics, Cornell University, Ithaca, NY 14853 USA; e-mail: irena@math.cornell.edu
   
   Number theory, Henri Darmon

3. GEOMETRIC ANALYSIS & PDE
   Coordinating Editor: Tatiana Toro, Department of Mathematics, University of Washington, Box 354350, Seattle, WA 98195-4350 USA; e-mail: toro@uw.edu
   
   Geometric analysis, Tatiana Toro
   
   Harmonic analysis and partial differential equations, Monica Vasan, Department of Mathematics, University of California Los Angeles, 520 Portola Plaza, Los Angeles, CA 90095 USA; e-mail: visan@math.ucla.edu
   
   Partial differential equations and functional analysis, Alexander A. Kiselev, Department of Mathematics, Duke University, 120 Science Drive, Rm 117 Physics Bldg, Durham, NC 27708 USA; e-mail: kiselev@math.duke.edu
   
   Real analysis and partial differential equations, Wilhelm Schlag, Department of Mathematics, Yale University, 10 Hillhouse Avenue, Office DL437, New Haven, CT 06520 USA; e-mail: wilhelm.schlag@yale.edu

4. ERGODIC THEORY, DYNAMICAL SYSTEMS & COMBINATORICS
   Coordinating Editor: Vitaly Bergelson, Department of Mathematics, Ohio State University, 231 W. 18th Avenue, Columbus, OH 43210 USA; e-mail: vitaly@math.ohio-state.edu
   
   Algebraic and enumerative combinatorics, Jim Haglund, Department of Mathematics, University of Pennsylvania, Philadelphia, PA 19104 USA; e-mail: jhaglund@math.upenn.edu
Probability theory, Robin Pemantle, Department of Mathematics, University of Pennsylvania, 209 S. 33rd Street, Philadelphia, PA 19104 USA; e-mail: pemantle@math.upenn.edu

Dynamical systems and ergodic theory, Ian Melbourne, Mathematics Institute, University of Warwick, Coventry CV4 7AL, United Kingdom; e-mail: I.Melbourne@warwick.ac.uk

Ergodic theory and combinatorics, Vitaly Bergelson

5. ANALYSIS, LIE THEORY & PROBABILITY
   Coordinating Editor: Stefaan Vaes, Department of Mathematics, Katholieke Universiteit Leuven, Celestijnenlaan 200B, B-3001 Leuven, Belgium; e-mail: stefaan.vaes@wis.kuleuven.be

Functional analysis and operator algebras, Stefaan Vaes

Harmonic analysis and complex analysis, Malabika Pramanik, Department of Mathematics, University of British Columbia, 1984 Mathematics Road, Vancouver, British Columbia V6T 1Z2, Canada; e-mail: malabika@math.ubc.ca

Langlands conjectures, Marie-France Vigneras, 8 Rue des Ecoles, 75005 Paris, France; e-mail: marie-france.vigneras@imj-prg.fr

Probability and statistics, Patrick J. Fitzsimmons, Department of Mathematics, University of California, San Diego, 9500 Gilman Drive, La Jolla, CA 92093-0112 USA; e-mail: pfitzsim@ucsd.edu

MEMOIRS OF THE AMERICAN MATHEMATICAL SOCIETY

Memoirs is devoted to research in pure and applied mathematics of the same nature as Transactions. An issue consists of one or more separately bound research tracts for which the authors provide reproduction copy. Papers intended for Memoirs should normally be at least 80 pages in length. Memoirs has the same editorial committee as Transactions; authors may choose an Editor from the list above upon submission.
(Continued from back cover)

Dana Mendelson, Andrea R. Nahmod, Nataša Pavlović, and Gigliola Staffilani, An infinite sequence of conserved quantities for the cubic Gross–Pitaevskii hierarchy on $\mathbb{R}$ .......................................................... 5179

Tobias Kaiser and Patrick Speissegger, Analytic continuations of log-exp-analytic germs .......................................................... 5203
Steven Hurder and Olga Lukina, Wild solenoids .......................... 4493
Alexander Kleshchev and Robert Muth, Affine zigzag algebras and imaginary strata for KLR algebras ................................. 4535
Corentin Perret-Gentil, Distribution questions for trace functions with values in cyclotomic integers and their reductions .................... 4585
Chao Li, 2-Selmer groups, 2-class groups and rational points on elliptic curves .......................................................... 4631
Jaehoon Kim, Daniela Kühn, Deryk Osthus, and Mykhaylo Tyomkyn, A blow-up lemma for approximate decompositions ........... 4655
Victor Vilaça Da Rocha, Modified scattering and beating effect for coupled Schrödinger systems on product spaces with small initial data .... 4743
Oran Gannot, The null-geodesic flow near horizons .......................... 4769
Elijah Liflyand and Akihiko Miyachi, Boundedness of multidimensional Hausdorff operators in $H^p$ spaces, $0 < p < 1$ ......................... 4793
Brian Lehmann, Iitaka dimension for cycles .................................... 4815
Alex Amenta, Emiel Lorist, and Mark Veraar, Fourier multipliers in Banach function spaces with UMD concavifications .................. 4837
A. Yu. Olshanskii and M. V. Sapir, On flat submaps of maps of nonpositive curvature ......................................................... 4869
Thomas Murphy and Paul-Andi Nagy, Complex Riemannian foliations of open Kähler manifolds .................................................. 4895
Shantanu Dave and Stefan Haller, On 5-manifolds admitting rank two distributions of Cartan type .................................................. 4911
Ricardo A. E. Mendes and Marco Radeschi, A slice theorem for singular Riemannian foliations, with applications ............................... 4931
Yonatan Gutman, Freddie Manners, and Péter P. Varjú, The structure theory of Nilspaces II: Representation as nilmanifolds .............. 4951
Yuki Hirano, Relative singular locus and Balmer spectrum of matrix factorizations ................................................................. 4993
Aeryeong Seo, A Kobayashi pseudo-distance for holomorphic bracket generating distributions .................................................... 5023
Sean Cox and Monroe Eskew, Strongly proper forcing and some problems of Foreman ............................................................... 5039
Darren C. Ong and Christian Remling, Generalized Toda flows .......... 5069
Fabio Cavalletti, Marc Sedjro, and Michael Westdickenberg, A variational time discretization for compressible Euler equations .............. 5083
Jorge Hounie and Giuliano Zugliani, Global solvability of real analytic involutive systems on compact manifolds. Part 2 ..................... 5157
(Continued on inside back cover)