Henry Wilton, Essential surfaces in graph pairs ......................... 893
Tomoyuki Abe, Langlands correspondence for isocrystals and the existence of crystalline companions for curves ......................... 921
Dawei Chen, Martin Möller, and Don Zagier, Quasimodularity and large genus limits of Siegel-Veech constants ......................... 1059
Gregory R. Chambers, Dominic Dotterrer, Fedor Manin, and Shmuel Weinberger, with an appendix by Fedor Manin and Shmuel Weinberger, Quantitative null-cobordism ..................... 1165
Abe, Tomoyuki. *Langlands correspondence for isocrystals and the existence of crystalline companions for curves*, 921
Arinkin, D., and D. Gaitsgory. *The category of singularities as a crystal and global Springer fibers*, 135
Carlsson, Erik, and Anton Mellit. *A proof of the shuffle conjecture*, 661
Chambers, Gregory R., Dominic Dotterrer, Fedor Manin, and Shmuel Weinberger, with an appendix by Fedor Manin and Shmuel Weinberger. *Quantitative null-cobordism*, 1165
Chen, Dawei, Martin Möller, and Don Zagier. *Quasimodularity and large genus limits of Siegel-Veech constants*, 1059
Chernikov, Artem, and Pierre Simon. *Definably amenable NIP groups*, 609
Dotterrer, Dominic. *See Chambers, Gregory R.*
Ford, Kevin, Ben Green, Sergei Konyagin, James Maynard, and Terence Tao. *Long gaps between primes*, 65
Frécon, Olivier. *Simple groups of Morley rank 3 are algebraic*, 643
Fuchs, Clemens, Vincenzo Mantova, and Umberto Zannier. *On fewnomials, integral points, and a toric version of Bertini’s theorem*, 107
Gaitsgory, D. *See* Arinkin, D.
Green, Ben. *See* Ford, Kevin
Gross, Mark, Paul Hacking, Sean Keel, and Maxim Kontsevich. *Canonical bases for cluster algebras*, 497
Gubinelli, Massimiliano, and Nicolas Perkowski. *Energy solutions of KPZ are unique*, 427
Hacking, Paul. *See* Gross, Mark
Iyengar, Srikanth B. *See* Benson, Dave
Jang, Seung, and Junehyuk Jung. *Quantum unique ergodicity and the number of nodal domains of eigenfunctions*, 303
Jung, Junehyuk. *See* uk Jang, Seung
Kang, Seok-Jin, Masaki Kashiwara, Myungho Kim, and Se-jin Oh. *Monoidal categorification of cluster algebras*, 349
Kashiwara, Masaki. *See* Kang, Seok-Jin
Keel, Sean. *See* Gross, Mark
Kim, Myungho. *See* Kang, Seok-Jin
Kontsevich, Maxim. *See* Gross, Mark
Konyagin, Sergei. *See* Ford, Kevin
Krause, Henning. *See* Benson, Dave
Laforgue, Vincent. *Chéroux pour les groupes réductifs et paramétrisation de Langlands globale*, 719
Lancien, G. *See* Baudier, F.
Luk, Jonathan. *Weak null singularities in general relativity*, 1
Manin, Fedor. *See* Chambers, Gregory R.
Mantova, Vincenzo. *See* Fuchs, Clemens
Maynard, James. *See* Ford, Kevin
McCullough, Jason, and Irena Peeva. *Counterexamples to the Eisenbud–Goto regularity conjecture*, 473
Mellit, Anton. *See* Carlsson, Erik
Möller, Martin. *See* Chen, Dawei
Oh, Se-jin. *See* Kang, Seok-Jin
Peeva, Irena. *See* McCullough, Jason
Perkowski, Nicolas. *See* Gubinelli, Massimiliano
Pevtsova, Julia. *See* Benson, Dave
Przytycki, Piotr, and Daniel T. Wise. *Mixed 3-manifolds are virtually special*, 319
Randal-Williams, Oscar. *See* Galatius, Søren
Schlumprecht, Th. *See* Baudier, F.
INDEX TO VOLUME 31 (2018)

Simon, Pierre.  See Chernikov, Artem
Tao, Terence.  See Ford, Kevin
Weinberger, Shmuel.  See Chambers, Gregory R.
Wilton, Henry.  Essential surfaces in graph pairs, 893
Wise, Daniel T.  See Przytycki, Piotr
Zagier, Don.  See Chen, Dawei
Zannier, Umberto.  See Fuchs, Clemens
Jonathan Luk, Weak null singularities in general relativity .......... 1
Kevin Ford, Ben Green, Sergei Konyagin, James Maynard, and Terence Tao, Long gaps between primes ......................... 65
Clemens Fuchs, Vincenzo Mantova, and Umberto Zannier, On fewnomials, integral points, and a toric version of Bertini’s theorem . 107
D. Arinkin and D. Gaitsgory, The category of singularities as a crystal and global Springer fibers ........................................... 135
Søren Galatius and Oscar Randal-Williams, Homological stability for moduli spaces of high dimensional manifolds. I ......................... 215
Dave Benson, Srikanth B. Iyengar, Henning Krause, and Julia Pevtsova, Stratification for module categories of finite group schemes 265

Seung uk Jang and Junehyuk Jung, Quantum unique ergodicity and the number of nodal domains of eigenfunctions ..................... 303
Piotr Przytycki and Daniel T. Wise, Mixed 3-manifolds are virtually special ................................................................. 319
Seok-Jin Kang, Masaki Kashiwara, Myungho Kim, and Se-jin Oh, Monoidal categorification of cluster algebras ......................... 349
Massimiliano Gubinelli and Nicolas Perkowski, Energy solutions of KPZ are unique ......................................................... 427
Jason McCullough and Irena Peeva, Counterexamples to the Eisenbud–Goto regularity conjecture ........................................... 473
Mark Gross, Paul Hacking, Sean Keel, and Maxim Kontsevich, Canonical bases for cluster algebras ...................................... 497

Artem Chernikov and Pierre Simon, Definably amenable NIP groups . 609
Olivier Frécon, Simple groups of Morley rank 3 are algebraic ............. 643
Erik Carlsson and Anton Mellit, A proof of the shuffle conjecture ....... 661
F. Baudier, G. Lancien, and Th. Schlumprecht, The coarse geometry of Tsirelson’s space and applications ................................. 699
Vincent Lafforgue, Choucas pour les groupes réductifs et paramétrisation de Langlands globale ................................. 719
Henry Wilton, Essential surfaces in graph pairs .......................... 893
Tomoyuki Abe, Langlands correspondence for isocrystals and the existence of crystalline companions for curves ................................. 921
Dawei Chen, Martin Möller, and Don Zagier, Quasimodularity and large genus limits of Siegel-Veech constants ............................... 1059
Gregory R. Chambers, Dominic Dotterrer, Fedor Manin, and Shmuel Weinberger, with an appendix by Fedor Manin and Shmuel Weinberger, Quantitative null-cobordism ...................... 1165
Editors

Brian Conrad  
Department of Mathematics  
Stanford University  
Stanford, CA 94305 USA  
conrad@math.stanford.edu

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

Sergey Fomin  
Department of Mathematics  
University of Michigan  
530 Church Street  
Ann Arbor, MI 48109-1043 USA  
fomin@umich.edu

Assaf Naor  
Department of Mathematics  
Princeton University  
Fine Hall, Washington Road  
Princeton, NJ 08544 USA  
naor@math.princeton.edu

Igor Rodnianski  
Department of Mathematics  
Princeton University  
Fine Hall, Washington Road  
Princeton, NJ 08544 USA  
irod@math.princeton.edu

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

Associate Editors

Ian Agol, University of California, Berkeley  
Denis Auroux, Harvard University  
Andrea Bertozzi, University of California, Los Angeles  
Roman Bezrukavnikov, Massachusetts Institute of Technology  
Dmitry Dolgopyat, University of Maryland  
Alice Guionnet, Massachusetts Institute of Technology  
Lawrence Guth, Massachusetts Institute of Technology  
Ursula Hamenstadt, University of Bonn  
Lars Hesselholt, Nagoya University  
Richard Kenyon, Brown University  
Michael J. Larsen, Indiana University  
Ciprian Manolescu, University of California, Los Angeles  
William P. Minicozzi II, Massachusetts Institute of Technology  
Anand Pillay, University of Notre Dame  
Peter Sarnak, The Institute for Advanced Study and Princeton University  
Peter Scholze, Universität Bonn  
Amit Singer, Princeton University  
Benjamin Sudakov, ETH Zürich  
Ulrike Tillmann, University of Oxford  
Burt Totaro, University of California, Los Angeles
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 \texttt{AMS-LATEX}. To this end, the Society has prepared \texttt{AMS-LATEX} 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{AMS-LATEX} style file and the \texttt{\label} and \texttt{\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.
Henry Wilton, *Essential surfaces in graph pairs* ......................... 893
Tomoyuki Abe, *Langlands correspondence for isocrystals and the existence of crystalline companions for curves* ......................... 921
Dawei Chen, Martin Möller, and Don Zagier, *Quasimodularity and large genus limits of Siegel-Veech constants* ......................... 1059
Gregory R. Chambers, Dominic Dotterrer, Fedor Manin, and Shmuel Weinberger, with an appendix by Fedor Manin and Shmuel Weinberger, *Quantitative null-cobordism* ...................... 1165