DESCRIPTION

*Computer Physics Communications* publishes research papers and application software in the broad field of computational physics; current areas of particular interest are reflected by the research interests and expertise of the *CPC Editorial Board*. The focus is on contemporary computational methods and techniques and their implementation, the effectiveness of which will normally be demonstrated by the author(s) in the context of a substantive problem in physics.

Papers describing new software in physics, updates to software previously published by CPC, and established software of importance to the community are encouraged. The submitted software must adhere to one of the Original Software Publications (OSP) pre-approved licenses and will be freely available for download from the CPC Program Library stored on the Mendeley Data repository. [The existing archive of over 3,000 computer programs dating from 1969 will remain at http://cpc.cs.qub.ac.uk until it is migrated to Mendeley Data.]

Articles cover, but are not limited to, the following themes across computational physics and cognate disciplines: computational models and programs; computational models and programs associated with the design, control and analysis of experiments; mathematical and numerical methods and algorithms; algebraic computation; the impact of advanced computer architecture and special purpose computers on computing in the physical sciences; and software topics related to, and of importance in, the physical sciences.

Feature Articles are solicited by invitation and are aimed at highlighting topical subjects and providing reviews of important bodies of research work. Special and thematic issues are published on an occasional basis and enquiries should be directed to a member of the *CPC Editorial Board*.

Benefits to authors

We also provide many author benefits, such as free PDFs, a liberal copyright policy, special discounts on Elsevier publications and much more. Please click here for more information on our author services.

Please see our *Guide for Authors* for information on article submission. If you require any further information or help, please visit our *Support Center*. 
AUDIENCE

Experimental and theoretical physicists and chemists in all fields of physics working with computational techniques.

IMPACT FACTOR

2018: 3.309 © Clarivate Analytics Journal Citation Reports 2019

ABSTRACTING AND INDEXING

Scopus
ISI Science Citation Index
Zentralblatt MATH
INSPEC

EDITORIAL BOARD

Co-ordinating Principal Editor and Library Director
N. Stanley Scott, Queen's University Belfast, Faculty of Engineering and Physical Sciences, 6 Malone Road, Belfast BT9 5BN, United Kingdom

Principal Editors
Stephan Fritzsche, Friedrich Schiller University Jena, Jena, Germany
Andrew Hazel, The University of Manchester, Manchester, United Kingdom
David Landau, The University of Georgia, Athens, Georgia, United States
David W. Walker, Cardiff University, Cardiff, United Kingdom
Zbigniew Was, Henryka Niewodniczanskiego Institute of Nuclear Physics, Krakow, Poland

Technical Editor
J. Ballantyne, University of the Highlands and Islands Inverness College, Inverness, United Kingdom

Algebraic Manipulation
Edgardo S. Cheb-Terrab, Waterloo Maple Inc, Waterloo, Ontario, Canada

Astronomy and Astrophysics
W. Dehnen, University of Leicester, Leicester, United Kingdom

Atomic and Optical Physics
J. D. Gorfinkiel, The Open University, School of Physical Sciences, Faculty of Science, Technology, Engineering & Mathematics, Milton Keynes, United Kingdom
B.I. Schneider, National Institute of Standards and Technology, Gaithersburg, Maryland, United States
S. Skupin, Intense Lasers and Applications Centre, Talence, France

Biophysics
Qiang Cui, University of Wisconsin Madison, Madison, Wisconsin, United States
B. Montgomery Pettitt, UNIVERSITY OF TEXAS MEDICAL BRANCH AT GALVESTON, Galveston, Texas, United States

Chemical, Molecular and Materials Physics and Physical Chemistry
W.A. de Jong, E O Lawrence Berkeley National Laboratory, Berkeley, California, United States
M Meuwly, University of Basel, Basel, Switzerland
Aiichiro Nakano, University of Southern California, Los Angeles, California, United States

Condensed Matter Physics
J. Adler, Technion Israel Institute of Technology, Haifa, Israel
V. Blum, Duke University, Durham, North Carolina, United States
B.K. Clark, University of Illinois at Urbana-Champaign, Champaign, Illinois, United States
N. T. Maitra, Hunter College, New York, United States
J. A. Plascak, University of Georgia Franklin College of Arts and Sciences Department of Physics and Astronomy, Athens, Georgia, United States
A.M. Rappe, University of Pennsylvania, Philadelphia, Pennsylvania, United States
M. Weigel, Coventry University, Coventry, United Kingdom
Bo Zheng, Zhejiang University, Hangzhou, China

HPC, Grid and Novel Computing
X. Guo, Sci-Tech Daresbury, Warrington, United Kingdom
D.S. Nikopolous, Queen's University Belfast, Belfast, United Kingdom
Nico Sanna, University of Tuscia, Viterbo, Italy

Mathematical and Numerical Methods
A.J.C. Crespo, University of Vigo Environmental Physics Laboratory, Ourense, Spain
R. D’Ambrosio, University of Aquila, L'Aquila, Italy
L. van Veen, University of Ontario Institute of Technology, Oshawa, Ontario, Canada
P. Vincent, Imperial College London, London, United Kingdom

Nuclear physics
G.R. Jansen, Oak Ridge National Laboratory, Oak Ridge, Tennessee, United States
I. J. Thompson, Lawrence Livermore National Laboratory, Livermore, California, United States

Physics of Elementary Particles and Fields
A. Bogomyagkov, Budker Institute of Nuclear Physics SB RAS, Novosibirsk, Russian Federation
T. Hahn, Max Planck Institute of Physics, Munchen, Germany
A.D. Kennedy, The University of Edinburgh, Edinburgh, United Kingdom
Jim Linnemann, Michigan State University, East Lansing, Michigan, United States
Claudio Rebbi, Boston University, Boston, Massachusetts, United States

Physics of Gases, Plasmas and Electric Discharges
B. Dudson, University of York Department of Physics, York, United Kingdom
K. Germaschewski, University of New Hampshire, Durham, New Hampshire, United States
F. Jenko, Max-Planck-Institute of Plasma Physics, Garching, Germany
GUIDE FOR AUTHORS

INTRODUCTION
An International Journal and Program Library for Computational Physics

Computer Physics Communications (CPC) publishes research papers and application software in the broad field of computational physics; current areas of particular interest are reflected by the research interests and expertise of the CPC Editorial Board.

Useful Links

The journal's home page is located at https://www.elsevier.com/locate/cpc
The CPC Program Library is located at https://data.mendeley.com/datasets/journals/00104655
The Elsevier Editorial System (EES) is located at http://ees.elsevier.com/cpc

Scope

The focus of CPC is on contemporary computational methods and techniques and their implementation, the effectiveness of which will normally be demonstrated by the author(s) in the context of a substantive problem in physics. Articles cover, but are not limited to, the following themes across computational physics and cognate disciplines: computational models and programs; computational models and programs associated with the design, control and analysis of experiments; mathematical and numerical methods and algorithms; algebraic computation; the impact of advanced computer architecture and special purpose computers on computing in the physical sciences; and software topics related to, and of importance in, the physical sciences.

Types of contribution

Computer Physics Communications publishes the following types of papers. [Special and thematic issues are published on an occasional basis and enquiries should be directed to a member of the CPC Editorial Board.]

Computational Physics Papers (CP). These are research papers in any area of computational physics.

Computer Programs in Physics Papers (CPiP). These are full papers describing new or revised programs to be placed in the CPC Program Library. The submitted software must adhere to one of the Original Software Publications (OSP) pre-approved licenses: MIT license (MIT)/Apache License, 2.0 (Apache-2.0)/ Creative Commons by 4.0 (CC by 4.0)/ Creative Commons Zero (CC0)/BSD 3-Clause/BSD 2-Clause/ GNU General Public License 3/ GNU General Public License 2/ LGPL/ CC by NC 3.0/ MPL-2.0

New Version Announcements (NVA). These are short descriptions of revisions to programs in the CPC Program Library. They are not peer reviewed and are intended to facilitate the rapid publication of program revisions that do not merit a full paper description.

Features articles. These articles, which are normally arranged by invitation from an editor, are used to highlight a topical subject or to provide a review of an important body of research work that is of interest to the readership.

Features articles. These articles, which are normally arranged by invitation from an editor, are used to highlight a topical subject or to provide a review of an important body of research work that is of interest to the readership.

Computer Programs in Physics Papers (CPiP). These are full papers describing new or revised programs to be placed in the CPC Program Library. The submitted software must adhere to one of the Original Software Publications (OSP) pre-approved licenses: MIT license (MIT)/Apache License, 2.0 (Apache-2.0)/ Creative Commons by 4.0 (CC by 4.0)/ Creative Commons Zero (CC0)/BSD 3-Clause/BSD 2-Clause/ GNU General Public License 3/ GNU General Public License 2/ LGPL/ CC by NC 3.0/ MPL-2.0

New Version Announcements (NVA). These are short descriptions of revisions to programs in the CPC Program Library. They are not peer reviewed and are intended to facilitate the rapid publication of program revisions that do not merit a full paper description.

Features articles. These articles, which are normally arranged by invitation from an editor, are used to highlight a topical subject or to provide a review of an important body of research work that is of interest to the readership.

Computer Programs in Physics Papers (CPiP). These are full papers describing new or revised programs to be placed in the CPC Program Library. The submitted software must adhere to one of the Original Software Publications (OSP) pre-approved licenses: MIT license (MIT)/Apache License, 2.0 (Apache-2.0)/ Creative Commons by 4.0 (CC by 4.0)/ Creative Commons Zero (CC0)/BSD 3-Clause/BSD 2-Clause/ GNU General Public License 3/ GNU General Public License 2/ LGPL/ CC by NC 3.0/ MPL-2.0

New Version Announcements (NVA). These are short descriptions of revisions to programs in the CPC Program Library. They are not peer reviewed and are intended to facilitate the rapid publication of program revisions that do not merit a full paper description.

Features articles. These articles, which are normally arranged by invitation from an editor, are used to highlight a topical subject or to provide a review of an important body of research work that is of interest to the readership.

Computer Programs in Physics Papers (CPiP). These are full papers describing new or revised programs to be placed in the CPC Program Library. The submitted software must adhere to one of the Original Software Publications (OSP) pre-approved licenses: MIT license (MIT)/Apache License, 2.0 (Apache-2.0)/ Creative Commons by 4.0 (CC by 4.0)/ Creative Commons Zero (CC0)/BSD 3-Clause/BSD 2-Clause/ GNU General Public License 3/ GNU General Public License 2/ LGPL/ CC by NC 3.0/ MPL-2.0

New Version Announcements (NVA). These are short descriptions of revisions to programs in the CPC Program Library. They are not peer reviewed and are intended to facilitate the rapid publication of program revisions that do not merit a full paper description.

Features articles. These articles, which are normally arranged by invitation from an editor, are used to highlight a topical subject or to provide a review of an important body of research work that is of interest to the readership.

Computer Programs in Physics Papers (CPiP). These are full papers describing new or revised programs to be placed in the CPC Program Library. The submitted software must adhere to one of the Original Software Publications (OSP) pre-approved licenses: MIT license (MIT)/Apache License, 2.0 (Apache-2.0)/ Creative Commons by 4.0 (CC by 4.0)/ Creative Commons Zero (CC0)/BSD 3-Clause/BSD 2-Clause/ GNU General Public License 3/ GNU General Public License 2/ LGPL/ CC by NC 3.0/ MPL-2.0

New Version Announcements (NVA). These are short descriptions of revisions to programs in the CPC Program Library. They are not peer reviewed and are intended to facilitate the rapid publication of program revisions that do not merit a full paper description.

Features articles. These articles, which are normally arranged by invitation from an editor, are used to highlight a topical subject or to provide a review of an important body of research work that is of interest to the readership.

Computer Programs in Physics Papers (CPiP). These are full papers describing new or revised programs to be placed in the CPC Program Library. The submitted software must adhere to one of the Original Software Publications (OSP) pre-approved licenses: MIT license (MIT)/Apache License, 2.0 (Apache-2.0)/ Creative Commons by 4.0 (CC by 4.0)/ Creative Commons Zero (CC0)/BSD 3-Clause/BSD 2-Clause/ GNU General Public License 3/ GNU General Public License 2/ LGPL/ CC by NC 3.0/ MPL-2.0

New Version Announcements (NVA). These are short descriptions of revisions to programs in the CPC Program Library. They are not peer reviewed and are intended to facilitate the rapid publication of program revisions that do not merit a full paper description.

Features articles. These articles, which are normally arranged by invitation from an editor, are used to highlight a topical subject or to provide a review of an important body of research work that is of interest to the readership.

Computer Programs in Physics Papers (CPiP). These are full papers describing new or revised programs to be placed in the CPC Program Library. The submitted software must adhere to one of the Original Software Publications (OSP) pre-approved licenses: MIT license (MIT)/Apache License, 2.0 (Apache-2.0)/ Creative Commons by 4.0 (CC by 4.0)/ Creative Commons Zero (CC0)/BSD 3-Clause/BSD 2-Clause/ GNU General Public License 3/ GNU General Public License 2/ LGPL/ CC by NC 3.0/ MPL-2.0

New Version Announcements (NVA). These are short descriptions of revisions to programs in the CPC Program Library. They are not peer reviewed and are intended to facilitate the rapid publication of program revisions that do not merit a full paper description.

Features articles. These articles, which are normally arranged by invitation from an editor, are used to highlight a topical subject or to provide a review of an important body of research work that is of interest to the readership.

Computer Programs in Physics Papers (CPiP). These are full papers describing new or revised programs to be placed in the CPC Program Library. The submitted software must adhere to one of the Original Software Publications (OSP) pre-approved licenses: MIT license (MIT)/Apache License, 2.0 (Apache-2.0)/ Creative Commons by 4.0 (CC by 4.0)/ Creative Commons Zero (CC0)/BSD 3-Clause/BSD 2-Clause/ GNU General Public License 3/ GNU General Public License 2/ LGPL/ CC by NC 3.0/ MPL-2.0

New Version Announcements (NVA). These are short descriptions of revisions to programs in the CPC Program Library. They are not peer reviewed and are intended to facilitate the rapid publication of program revisions that do not merit a full paper description.

Features articles. These articles, which are normally arranged by invitation from an editor, are used to highlight a topical subject or to provide a review of an important body of research work that is of interest to the readership.
appropriate, supplied with a separate User Manual, which together with the manuscript should make clear the structure, functionality, installation, and operation of the program. **All CPIP manuscripts must contain the following Program Summary section immediately following the abstract.**

**1 PROGRAM SUMMARY/NEW VERSION PROGRAM SUMMARY (delete as appropriate)**

Program title: Licensing provisions (please choose one): MIT license (MIT)/Apache License, 2.0 (Apache-2.0)/ Creative Commons by 4.0 (CC by 4.0)/ Creative Commons Zero (CC0)/BSD 3-Clause/BSD 2-Clause/ GNU General Public License 3 (GPL)/GNU General Public License 2/ LGPL/ CC by NC 3.0/ MPL-2.0 Programming language: Supplementary material (if any): Journal Reference of previous version:** Does the new version supersede the previous version?:** Reasons for the new version:** Summary of revisions:** Nature of problem (approx. 50-250 words): Solution method (approx. 50-250 words): Additional comments including Restrictions and Unusual features (approx. 50-250 words): References:

Program submission. Manuscripts that describe computer programs and NVAs must be accompanied by: the program source code; job control scripts, where applicable; a README file giving the names and a brief description of all the files that make up the package and clear instructions on the installation and execution of the program; sample input and output data for at least one comprehensive test run that will convince the reviewers that the program operates as specified; and, where appropriate, a user manual.

A compressed archive program file or files, containing these items, should be uploaded at the "Attach Files" stage of the EES submission. The maximum file size allowed is 700Mb. For files larger than this the author should contact the Technical Editor at cpc.mendeley@gmail.com.

For program files uploaded during submission, a link is created in the manuscript built by the EES, (Actions - View submission). The position of the link within the manuscript is governed by the order in which files were uploaded. If the program file is the last file uploaded, the link will appear at the end of the document. Editors and reviewers can download a copy of the code by clicking on this link. The Technical Editor will check the completeness of the submitted files and adherence to OSP pre-approved licenses. Should any problems be encountered, the Technical Editor will contact the author directly and work with the author to resolve the problem before the submission is assigned to an editor.

**Submission checklist**

You can use this list to carry out a final check of your submission before you send it to the journal for review. Please check the relevant section in this Guide for Authors for more details.

**Ensure that the following items are present:**

One author has been designated as the corresponding author with contact details:

- E-mail address
- Full postal address

All necessary files have been uploaded:

**Manuscript:**

- Include keywords
- All figures (include relevant captions)
- All tables (including titles, description, footnotes)
- Ensure all figure and table citations in the text match the files provided
- Indicate clearly if color should be used for any figures in print

**Graphical Abstracts / Highlights files** (where applicable)

**Supplemental files** (where applicable)

Further considerations

- Manuscript has been 'spell checked' and 'grammar checked'
- All references mentioned in the Reference List are cited in the text, and vice versa
- Permission has been obtained for use of copyrighted material from other sources (including the Internet)
- A competing interests statement is provided, even if the authors have no competing interests to declare
• Journal policies detailed in this guide have been reviewed
• Referee suggestions and contact details provided, based on journal requirements

For further information, visit our Support Center.

BEFORE YOU BEGIN

Ethics in publishing
Please see our information pages on Ethics in publishing and Ethical guidelines for journal publication.

Declaration of interest
All authors must disclose any financial and personal relationships with other people or organizations that could inappropriately influence (bias) their work. Examples of potential conflicts of interest include employment, consultancies, stock ownership, honoraria, paid expert testimony, patent applications/registrations, and grants or other funding. Authors should complete the declaration of interest statement using this template and upload to the submission system at the Attach/Upload Files step. If there are no interests to declare, please choose: ‘Declarations of interest: none’ in the template. This statement will be published within the article if accepted. More information.

Submission declaration and verification
Submission of an article implies that the work described has not been published previously (except in the form of an abstract, a published lecture or academic thesis, see ‘Multiple, redundant or concurrent publication’ for more information), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. To verify originality, your article may be checked by the originality detection service Crossref Similarity Check.

Preprints
Please note that preprints can be shared anywhere at any time, in line with Elsevier’s sharing policy. Sharing your preprints e.g. on a preprint server will not count as prior publication (see ‘Multiple, redundant or concurrent publication’ for more information).

Use of inclusive language
Inclusive language acknowledges diversity, conveys respect to all people, is sensitive to differences, and promotes equal opportunities. Articles should make no assumptions about the beliefs or commitments of any reader, should contain nothing which might imply that one individual is superior to another on the grounds of race, sex, culture or any other characteristic, and should use inclusive language throughout. Authors should ensure that writing is free from bias, for instance by using 'he or she', 'his/her' instead of 'he' or 'his', and by making use of job titles that are free of stereotyping (e.g. 'chairperson' instead of 'chairman' and 'flight attendant' instead of 'stewardess').

Author contributions
For transparency, we encourage authors to submit an author statement file outlining their individual contributions to the paper using the relevant CRediT roles: Conceptualization; Data curation; Formal analysis; Funding acquisition; Investigation; Methodology; Project administration; Resources; Software; Supervision; Validation; Visualization; Roles/Writing - original draft; Writing - review & editing. Authorship statements should be formatted with the names of authors first and CRediT role(s) following. More details and an example

Changes to authorship
Authors are expected to consider carefully the list and order of authors before submitting their manuscript and provide the definitive list of authors at the time of the original submission. Any addition, deletion or rearrangement of author names in the authorship list should be made only before the manuscript has been accepted and only if approved by the journal Editor. To request such a change, the Editor must receive the following from the corresponding author: (a) the reason for the change in author list and (b) written confirmation (e-mail, letter) from all authors that they agree with the addition, removal or rearrangement. In the case of addition or removal of authors, this includes confirmation from the author being added or removed.
Only in exceptional circumstances will the Editor consider the addition, deletion or rearrangement of authors after the manuscript has been accepted. While the Editor considers the request, publication of the manuscript will be suspended. If the manuscript has already been published in an online issue, any requests approved by the Editor will result in a corrigendum.
Article transfer service
This journal is part of our Article Transfer Service. This means that if the Editor feels your article is more suitable in one of our other participating journals, then you may be asked to consider transferring the article to one of those. If you agree, your article will be transferred automatically on your behalf with no need to reformat. Please note that your article will be reviewed again by the new journal. More information.

Copyright
Upon acceptance of an article, authors will be asked to complete a 'Journal Publishing Agreement' (see more information on this). An e-mail will be sent to the corresponding author confirming receipt of the manuscript together with a 'Journal Publishing Agreement' form or a link to the online version of this agreement.

Subscribers may reproduce tables of contents or prepare lists of articles including abstracts for internal circulation within their institutions. Permission of the Publisher is required for resale or distribution outside the institution and for all other derivative works, including compilations and translations. If excerpts from other copyrighted works are included, the author(s) must obtain written permission from the copyright owners and credit the source(s) in the article. Elsevier has preprinted forms for use by authors in these cases.

For gold open access articles: Upon acceptance of an article, authors will be asked to complete an 'Exclusive License Agreement' (more information). Permitted third party reuse of gold open access articles is determined by the author's choice of user license.

Author rights
As an author you (or your employer or institution) have certain rights to reuse your work. More information.

Elsevier supports responsible sharing
Find out how you can share your research published in Elsevier journals.

Role of the funding source
You are requested to identify who provided financial support for the conduct of the research and/or preparation of the article and to briefly describe the role of the sponsor(s), if any, in study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article for publication. If the funding source(s) had no such involvement then this should be stated.

Open access
Please visit our Open Access page from the Journal Homepage for more information.

Elsevier Researcher Academy
Researcher Academy is a free e-learning platform designed to support early and mid-career researchers throughout their research journey. The "Learn" environment at Researcher Academy offers several interactive modules, webinars, downloadable guides and resources to guide you through the process of writing for research and going through peer review. Feel free to use these free resources to improve your submission and navigate the publication process with ease.

Language (usage and editing services)
Please write your text in good English (American or British usage is accepted, but not a mixture of these). Authors who feel their English language manuscript may require editing to eliminate possible grammatical or spelling errors and to conform to correct scientific English may wish to use the English Language Editing service available from Elsevier's Author Services.

Submission
Our online submission system guides you stepwise through the process of entering your article details and uploading your files. The system converts your article files to a single PDF file used in the peer-review process. Editable files (e.g., Word, LaTeX) are required to typeset your article for final publication. All correspondence, including notification of the Editor's decision and requests for revision, is sent by e-mail.
Referees
Please submit the names and institutional e-mail addresses of several potential referees. For more details, visit our Support site. Note that the editor retains the sole right to decide whether or not the suggested reviewers are used.

PREPARATION

Peer review
This journal operates a single blind review process. All contributions will be initially assessed by the editor for suitability for the journal. Papers deemed suitable are then typically sent to a minimum of two independent expert reviewers to assess the scientific quality of the paper. The Editor is responsible for the final decision regarding acceptance or rejection of articles. The Editor's decision is final. More information on types of peer review.

Use of word processing software
It is important that the file be saved in the native format of the word processor used. The text should be in single-column format. Keep the layout of the text as simple as possible. Most formatting codes will be removed and replaced on processing the article. In particular, do not use the word processor's options to justify text or to hyphenate words. However, do use bold face, italics, subscripts, superscripts etc. When preparing tables, if you are using a table grid, use only one grid for each individual table and not a grid for each row. If no grid is used, use tabs, not spaces, to align columns. The electronic text should be prepared in a way very similar to that of conventional manuscripts (see also the Guide to Publishing with Elsevier). Note that source files of figures, tables and text graphics will be required whether or not you embed your figures in the text. See also the section on Electronic artwork.

To avoid unnecessary errors you are strongly advised to use the 'spell-check' and 'grammar-check' functions of your word processor.

LaTeX
You are recommended to use the Elsevier article class elsarticle.cls to prepare your manuscript and BibTeX to generate your bibliography.
Our LaTeX site has detailed submission instructions, templates and other information.

Article structure
Authors are encouraged to inspect a recent copy of the journal for examples of typical Computational Physics and Computer Programs in Physics article structures.

Subdivision - numbered sections
Divide your article into clearly defined and numbered sections. Subsections should be numbered 1.1 (then 1.1.1, 1.1.2, ...), 1.2, etc. (the abstract is not included in section numbering). Use this numbering also for internal cross-referencing: do not just refer to 'the text'. Any subsection may be given a brief heading. Each heading should appear on its own separate line.

Appendices
If there is more than one appendix, they should be identified as A, B, etc. Formulae and equations in appendices should be given separate numbering: Eq. (A.1), Eq. (A.2), etc.; in a subsequent appendix, Eq. (B.1) and so on. Similarly for tables and figures: Table A.1; Fig. A.1, etc.

Essential title page information
• Title. Concise and informative. Titles are often used in information-retrieval systems. Avoid abbreviations and formulae where possible.
• Author names and affiliations. Please clearly indicate the given name(s) and family name(s) of each author and check that all names are accurately spelled. You can add your name between parentheses in your own script behind the English transliteration. Present the authors' affiliation addresses (where the actual work was done) below the names. Indicate all affiliations with a lowercase superscript letter immediately after the author's name and in front of the appropriate address. Provide the full postal address of each affiliation, including the country name and, if available, the e-mail address of each author.
• Corresponding author. Clearly indicate who will handle correspondence at all stages of refereeing and publication, also post-publication. This responsibility includes answering any future queries about Methodology and Materials. Ensure that the e-mail address is given and that contact details are kept up to date by the corresponding author.
• Present/permanent address. If an author has moved since the work described in the article was done, or was visiting at the time, a 'Present address' (or 'Permanent address') may be indicated as a footnote to that author's name. The address at which the author actually did the work must be retained as the main, affiliation address. Superscript Arabic numerals are used for such footnotes.

Highlights
Highlights are optional yet highly encouraged for this journal, as they increase the discoverability of your article via search engines. They consist of a short collection of bullet points that capture the novel results of your research as well as new methods that were used during the study (if any). Please have a look at the examples here: example Highlights.

Highlights should be submitted in a separate editable file in the online submission system. Please use 'Highlights' in the file name and include 3 to 5 bullet points (maximum 85 characters, including spaces, per bullet point).

Abstract
A concise and factual abstract is required. The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separately from the article, so it must be able to stand alone. For this reason, References should be avoided, but if essential, then cite the author(s) and year(s). Also, non-standard or uncommon abbreviations should be avoided, but if essential they must be defined at their first mention in the abstract itself.

Keywords
Immediately after the abstract, provide a maximum of 6 keywords avoiding general and plural terms and multiple concepts (avoid, for example, "and", "of"). Be sparing with abbreviations: only abbreviations firmly established in the field may be eligible. These keywords will be used for indexing purposes.

CP papers - Title, Author(s), Affiliation(s), Abstract, and up to six Keywords, Main text, Acknowledgements (if any), Appendices (if any), References.
CPiP papers - Title, Author(s), Affiliation(s), Abstract and up to six Keywords, Program Summary, Main text, Acknowledgements (if any), Appendices (if any), References.
NVAs - Title, Author(s), Affiliation(s), Abstract, and up to six Keywords, Program Summary.

Abbreviations
Define abbreviations that are not standard in this field in a footnote to be placed on the first page of the article. Such abbreviations that are unavoidable in the abstract must be defined at their first mention there, as well as in the footnote. Ensure consistency of abbreviations throughout the article.

Acknowledgements
Collate acknowledgements in a separate section at the end of the article before the references and do not, therefore, include them on the title page, as a footnote to the title or otherwise. List here those individuals who provided help during the research (e.g., providing language help, writing assistance or proof reading the article, etc.).

Formatting of funding sources
List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].

It is not necessary to include detailed descriptions on the program or type of grants and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

If no funding has been provided for the research, please include the following sentence:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Units
Follow internationally accepted rules and conventions: use the international system of units (SI). If other units are mentioned, please give their equivalent in SI.
**Math formulae**
Please submit math equations as editable text and not as images. Present simple formulae in line with normal text where possible and use the solidus (/) instead of a horizontal line for small fractional terms, e.g., X/Y. In principle, variables are to be presented in italics. Powers of e are often more conveniently denoted by exp. Number consecutively any equations that have to be displayed separately from the text (if referred to explicitly in the text).

**Footnotes**
Footnotes should be used sparingly. Number them consecutively throughout the article. Many word processors can build footnotes into the text, and this feature may be used. Otherwise, please indicate the position of footnotes in the text and list the footnotes themselves separately at the end of the article. Do not include footnotes in the Reference list.

**Artwork**
**Electronic artwork**
*General points*
- Make sure you use uniform lettering and sizing of your original artwork.
- Embed the used fonts if the application provides that option.
- Aim to use the following fonts in your illustrations: Arial, Courier, Times New Roman, Symbol, or use fonts that look similar.
- Number the illustrations according to their sequence in the text.
- Use a logical naming convention for your artwork files.
- Provide captions to illustrations separately.
- Size the illustrations close to the desired dimensions of the published version.
- Submit each illustration as a separate file.
- Ensure that color images are accessible to all, including those with impaired color vision.

A detailed guide on electronic artwork is available.

**You are urged to visit this site; some excerpts from the detailed information are given here.**

**Formats**
If your electronic artwork is created in a Microsoft Office application (Word, PowerPoint, Excel) then please supply 'as is' in the native document format.

Regardless of the application used other than Microsoft Office, when your electronic artwork is finalized, please 'Save as' or convert the images to one of the following formats (note the resolution requirements for line drawings, halftones, and line/halftone combinations given below):

- **EPS (or PDF):** Vector drawings, embed all used fonts.
- **TIFF (or JPEG):** Color or grayscale photographs (halftones), keep to a minimum of 300 dpi.
- **TIFF (or JPEG):** Bitmapped (pure black & white pixels) line drawings, keep to a minimum of 1000 dpi.
- **TIFF (or JPEG):** Combinations bitmapped line/halftone (color or grayscale), keep to a minimum of 500 dpi.

**Please do not:**
- Supply files that are optimized for screen use (e.g., GIF, BMP, PICT, WPG); these typically have a low number of pixels and limited set of colors;
- Supply files that are too low in resolution;
- Submit graphics that are disproportionally large for the content.

**Color artwork**
Please make sure that artwork files are in an acceptable format (TIFF (or JPEG), EPS (or PDF), or MS Office files) and with the correct resolution. If, together with your accepted article, you submit usable color figures then Elsevier will ensure, at no additional charge, that these figures will appear in color online (e.g., ScienceDirect and other sites) regardless of whether or not these illustrations are reproduced in color in the printed version. **For color reproduction in print, you will receive information regarding the costs from Elsevier after receipt of your accepted article.** Please indicate your preference for color: in print or online only. Further information on the preparation of electronic artwork.

**Figure captions**
Ensure that each illustration has a caption. Supply captions separately, not attached to the figure. A caption should comprise a brief title (not on the figure itself) and a description of the illustration. Keep text in the illustrations themselves to a minimum but explain all symbols and abbreviations used.
Tables
Please submit tables as editable text and not as images. Tables can be placed either next to the relevant text in the article, or on separate page(s) at the end. Number tables consecutively in accordance with their appearance in the text and place any table notes below the table body. Be sparing in the use of tables and ensure that the data presented in them do not duplicate results described elsewhere in the article. Please avoid using vertical rules and shading in table cells.

References
Citation in text
Please ensure that every reference cited in the text is also present in the reference list (and vice versa). Any references cited in the abstract must be given in full. Unpublished results and personal communications are not recommended in the reference list, but may be mentioned in the text. If these references are included in the reference list they should follow the standard reference style of the journal and should include a substitution of the publication date with either 'Unpublished results' or 'Personal communication'. Citation of a reference as 'in press' implies that the item has been accepted for publication.

Web references
As a minimum, the full URL should be given and the date when the reference was last accessed. Any further information, if known (DOI, author names, dates, reference to a source publication, etc.), should also be given. Web references can be listed separately (e.g., after the reference list) under a different heading if desired, or can be included in the reference list.

Data references
This journal encourages you to cite underlying or relevant datasets in your manuscript by citing them in your text and including a data reference in your Reference List. Data references should include the following elements: author name(s), dataset title, data repository, version (where available), year, and global persistent identifier. Add [dataset] immediately before the reference so we can properly identify it as a data reference. The [dataset] identifier will not appear in your published article.

References in a special issue
Please ensure that the words 'this issue' are added to any references in the list (and any citations in the text) to other articles in the same Special Issue.

Reference management software
Most Elsevier journals have their reference template available in many of the most popular reference management software products. These include all products that support Citation Style Language styles, such as Mendeley. Using citation plug-ins from these products, authors only need to select the appropriate journal template when preparing their article, after which citations and bibliographies will be automatically formatted in the journal's style. If no template is yet available for this journal, please follow the format of the sample references and citations as shown in this Guide. If you use reference management software, please ensure that you remove all field codes before submitting the electronic manuscript. More information on how to remove field codes from different reference management software.

Users of Mendeley Desktop can easily install the reference style for this journal by clicking the following link:
http://open.mendeley.com/use-citation-style/computer-physics-communications
When preparing your manuscript, you will then be able to select this style using the Mendeley plug-ins for Microsoft Word or LibreOffice.

Reference style
Text: Indicate references by number(s) in square brackets in line with the text. The actual authors can be referred to, but the reference number(s) must always be given.
Example: '..... as demonstrated [3,6]. Barnaby and Jones [8] obtained a different result ....'
List: Number the references (numbers in square brackets) in the list in the order in which they appear in the text.
Examples:
Reference to a journal publication:
Reference to a journal publication with an article number:
Reference to a book:

Reference to a chapter in an edited book:

Reference to a website:

Reference to a dataset:

Journal abbreviations source
Journal names should be abbreviated according to the List of Title Word Abbreviations.

Video
Elsevier accepts video material and animation sequences to support and enhance your scientific research. Authors who have video or animation files that they wish to submit with their article are strongly encouraged to include links to these within the body of the article. This can be done in the same way as a figure or table by referring to the video or animation content and noting in the body text where it should be placed. All submitted files should be properly labeled so that they directly relate to the video file's content. In order to ensure that your video or animation material is directly usable, please provide the file in one of our recommended file formats with a preferred maximum size of 150 MB per file, 1 GB in total. Video and animation files supplied will be published online in the electronic version of your article in Elsevier Web products, including ScienceDirect. Please supply 'stills' with your files: you can choose any frame from the video or animation or make a separate image. These will be used instead of standard icons and will personalize the link to your video data. For more detailed instructions please visit our video instruction pages. Note: since video and animation cannot be embedded in the print version of the journal, please provide text for both the electronic and the print version for the portions of the article that refer to this content.

Data visualization
Include interactive data visualizations in your publication and let your readers interact and engage more closely with your research. Follow the instructions here to find out about available data visualization options and how to include them with your article.

Supplementary material
Supplementary material such as applications, images and sound clips, can be published with your article to enhance it. Submitted supplementary items are published exactly as they are received (Excel or PowerPoint files will appear as such online). Please submit your material together with the article and supply a concise, descriptive caption for each supplementary file. If you wish to make changes to supplementary material during any stage of the process, please make sure to provide an updated file. Do not annotate any corrections on a previous version. Please switch off the 'Track Changes' option in Microsoft Office files as these will appear in the published version.

Research data
This journal encourages and enables you to share data that supports your research publication where appropriate, and enables you to interlink the data with your published articles. Research data refers to the results of observations or experimentation that validate research findings. To facilitate reproducibility and data reuse, this journal also encourages you to share your software, code, models, algorithms, protocols, methods and other useful materials related to the project.

Below are a number of ways in which you can associate data with your article or make a statement about the availability of your data when submitting your manuscript. If you are sharing data in one of these ways, you are encouraged to cite the data in your manuscript and reference list. Please refer to the "References" section for more information about data citation. For more information on depositing, sharing and using research data and other relevant research materials, visit the research data page.
**Data linking**
If you have made your research data available in a data repository, you can link your article directly to the dataset. Elsevier collaborates with a number of repositories to link articles on ScienceDirect with relevant repositories, giving readers access to underlying data that gives them a better understanding of the research described.

There are different ways to link your datasets to your article. When available, you can directly link your dataset to your article by providing the relevant information in the submission system. For more information, visit the database linking page.

For **supported data repositories** a repository banner will automatically appear next to your published article on ScienceDirect.

In addition, you can link to relevant data or entities through identifiers within the text of your manuscript, using the following format: Database: xxxx (e.g., TAIR: AT1G01020; CCDC: 734053; PDB: 1XFN).

**Mendeley Data**
This journal supports Mendeley Data, enabling you to deposit any research data (including raw and processed data, video, code, software, algorithms, protocols, and methods) associated with your manuscript in a free-to-use, open access repository. Before submitting your article, you can deposit the relevant datasets to *Mendeley Data*. Please include the DOI of the deposited dataset(s) in your main manuscript file. The datasets will be listed and directly accessible to readers next to your published article online.

For more information, visit the [Mendeley Data for journals page](#).

**Data statement**
To foster transparency, we encourage you to state the availability of your data in your submission. This may be a requirement of your funding body or institution. If your data is unavailable to access or unsuitable to post, you will have the opportunity to indicate why during the submission process, for example by stating that the research data is confidential. The statement will appear with your published article on ScienceDirect. For more information, visit the Data Statement page.

**AFTER ACCEPTANCE**

**Proofs**
One set of page proofs (as PDF files) will be sent by e-mail to the corresponding author (if we do not have an e-mail address then paper proofs will be sent by post) or a link will be provided in the e-mail so that authors can download the files themselves. To ensure a fast publication process of the article, we kindly ask authors to provide us with their proof corrections within two days. Elsevier now provides authors with PDF proofs which can be annotated; for this you will need to [download the free Adobe Reader](#), version 9 (or higher). Instructions on how to annotate PDF files will accompany the proofs (also given online). The exact system requirements are given at the Adobe site.
If you do not wish to use the PDF annotations function, you may list the corrections (including replies to the Query Form) and return them to Elsevier in an e-mail. Please list your corrections quoting line number. If, for any reason, this is not possible, then mark the corrections and any other comments (including replies to the Query Form) on a printout of your proof and scan the pages and return via e-mail. Please use this proof only for checking the typesetting, editing, completeness and correctness of the text, tables and figures. Significant changes to the article as accepted for publication will only be considered at this stage with permission from the Editor. We will do everything possible to get your article published quickly and accurately. It is important to ensure that all corrections are sent back to us in one communication: please check carefully before replying, as inclusion of any subsequent corrections cannot be guaranteed. Proofreading is solely your responsibility.

**Offprints**
The corresponding author will, at no cost, receive a customized [Share Link](#) providing 50 days free access to the final published version of the article on ScienceDirect. The Share Link can be used for sharing the article via any communication channel, including email and social media. For an extra charge, paper offprints can be ordered via the offprint order form which is sent once the article is accepted for publication. Both corresponding and co-authors may order offprints at any time via
Elsevier's Author Services. Corresponding authors who have published their article gold open access do not receive a Share Link as their final published version of the article is available open access on ScienceDirect and can be shared through the article DOI link.

AUTHOR INQUIRIES
Visit the Elsevier Support Center to find the answers you need. Here you will find everything from Frequently Asked Questions to ways to get in touch. You can also check the status of your submitted article or find out when your accepted article will be published.

© Copyright 2018 Elsevier | https://www.elsevier.com