PHYSICAL REVIEW D
INFORMATION FOR CONTRIBUTORS
(Revised July 2000)

Information about this journal and other APS journals is available on the APS research-journals **World Wide Web** server at the URL http://publish.aps.org/. Much information is also available via ftp to aps.org in the subdirectories /jrnls, /pacs, /revtex, etc., of the /pub directory. Most filenames include as an extension a suffix (beginning with a period), which indicates the nature of the file: .asc (plain ASCII), .pdf (portable document file, usable with Acrobat), .ps (PostScript), or .tex (TeX). Most files exist in two or three versions, distinguished by the suffix. Some specific files are cited where pertinent below.

Manuscripts may be **submitted** by a variety of electronic modes (including via e-print servers, direct Web upload, and email), or by conventional mail, but not by fax. Interactive submission forms, available on our Web server, are an integral part of the submission process for the e-print and Web modes, and are strongly recommended for email and conventional-mail submission. These forms aid authors in supplying all the information needed in a structured format which furthers efficient processing; they also provide a location for additional ''free form'' information. [For authors without Web browsers which support forms, noninteractive versions of the submission forms are available via ftp to aps.org in the /pub/jrnls directory as the sub_prd files (include filename suffix .asc, .tex, or .ps), or by request to the Editorial Office.]

Please specify the author to whom correspondence should be addressed, and give all available communications information for this individual (postal and email addresses, phone and fax numbers), since in various circumstances they may all be useful. Please specify journal and section to which the paper is submitted, and give PACS (Physics and Astronomy Classification Scheme) index categories if possible. (The scheme is available on our Web server, and also via ftp to aps.org as the file pacs_99.asc in the /pub/pacs directory.) If an important subject of your paper cannot be appropriately classified in the PACS scheme, please give an appropriate keyword or phrase, and indicate approximately where in the scheme this topic would be best placed.

A signed APS **copyright-transfer** form should be included with the submission, and will be required before publication. While the transfer of copyright takes effect only upon acceptance of the paper for publication in an APS journal, supplying the form initially can prevent unnecessary delays. The form appears at the end of the 5 June 2000 issue of *Physical Review Letters* and is available from the Editorial Office, on the World Wide Web via the URL http://publish.aps.org/ or via ftp to aps.org in the /pub/jrnls directory as the copy_trnsfr files (include filename suffix .asc, .ps, or .tex). Be sure to use the latest (1/96 or later) version of the form.

Manuscripts and figures are *not routinely returned* to authors. Authors should indicate (preferably on initial submittal) if they want the manuscript and/or figures returned when correspondence is sent during the editorial process, and/or after a final decision has been made.

For detailed information about **electronic submissions**, see http://publish.aps.org/ESUB/. Properly prepared electronic submissions are **exempt from publication charges**. Those that use APS macro packages may qualify for the compuscript production program, under which author-supplied files are converted directly to production format and coding, rather than being rekeyed for publication. Receipt of an electronic submission will be acknowledged by email within 24 hours. Copies of the manuscript should not be sent by conventional mail unless the electronic transmission has not been successful. **Figures** for an electronic submission must be received in at least review-quality form before editorial processing can begin. The figures may be sent electronically (preferred) or by overnight mail, or review-quality figures may be sent by fax while the ''originals'' are sent by conventional or overnight mail as soon as possible. Refer to the online documentation for more detailed instructions.

Manuscripts sent by **conventional mail** should be submitted in triplicate to the Editors, Physical Review, 1 Research Road, Box 9000, Ridge, NY 11961-9000. The manuscript, including the abstract, references, and captions, should be neatly printed in English, on good letter-size (e.g., $8\frac{1}{2}\times 11$ in. or A4) white paper with ample margins. (The first copy, used for production purposes if the paper is accepted for publication, must be printed on one side of the paper only; additional copies, used for review purposes, may be printed on both sides of the paper.) The type size and line spacing should be sufficient to accommodate editorial markings and should be legible to our keyboarders (no more than three lines per inch and no more than 88 characters per 6 inches). It should be carefully proofread by the author. Poor reproductions are unacceptable, as are unclear or excessive handwritten insertions.

When a manuscript is **resubmitted**, please include a summary of changes made and a brief response to all recommendations and criticisms. The interactive resubmission forms

available on our Web server may be used for electronic-mail, Web-upload, and hard-copy transmission of modified manuscripts and figures. These forms should also be used when a manuscript previously submitted to one APS journal is resubmitted to another. When **resubmitting electronically**, send the complete file for the text if there have been any changes. Please refer to the online documentation for more detailed instructions. If the resubmission is by conventional mail, send three copies of the revised manuscript (with figures) and include the resubmission form or equivalent information. For any resubmission, please state whether or not the figures have been modified, and supply new PostScript-formatted figures or scanner-reproducible figures if there have been such changes. It is only necessary to resend the ''original'' figures if the previous versions are no longer valid. Please update any other information (e.g., address and communication information) that has changed or will change since initial submission.

For **general format and style** consult recent issues of this journal and the *Physical Review Style and Notation Guide*, available via ftp to aps.org in the /pub/jrnls directory as the style_guide files (include filename suffix .pdf, .ps, or .tex). Additional style guidelines can be found in the Fourth Edition of the *AIP Style Manual*, which may be obtained for $10.00 (prepaid) from Springer-Verlag, P.O. Box 2485, Secaucus, NJ 07096-2485.

The **title** should be concise but informative enough to facilitate information retrieval. The **abstract** should be self-contained (contain no footnotes). It should be adequate as an index (giving all subjects, major and minor, about which new information is given) and as a summary (giving the conclusions and all results of general interest in the article). It should be about 5% of the length of the article, but less than 500 words.

Notation should be clear, compact, and consistent with standard usage. **Equations** should be neatly formatted, punctuated, and aligned to bring out their structure, and numbered on the right. (a) Diacritical marks (tildes, etc.) can be put over any symbol, including indices. (b) Three-vectors are generally set in roman boldface type. More general vectors, matrices, etc., are usually set in lightface italic type, although boldface may alternatively be used. (c) Be careful when using the solidus (/) in fractions. For example, $1/2a$ means $1/(2a)$, not $(1/2)a$. Use appropriate bracketing if needed to ensure clarity.

References and footnotes to text material are usually combined in a single list, numbered consecutively in their order of first appearance in the paper, and placed in a double-spaced list at the end of the text material. They should be designated and cited in text by on-line Arabic numerals in square brackets. As an option, footnotes may appear separately from references and be placed at the bottom of the page on which they are cited. They should be designated by superscript numbers and numbered consecutively throughout the paper. Footnotes within tables should be designated by lower-case letter superscripts and given at the end of the table.

For the proper form for references, see the *Physical Review Style and Notation Guide* and recent issues of this journal. The names of all authors of works cited should be given in the references, unless the number of authors is greater than three; in this case, the first author's name followed by *et al.* is allowed. When reference is made to internal reports or other items not available in the open literature, it is the responsibility of the author to provide sufficient information to enable the reader to obtain a copy of the referenced material. References to classified reports or other documents with restricted circulation should be avoided. It is important to confirm the accuracy of bibliographic information in references. This has become more important now that the journal is online. Hyperlinks will be programmed to enable readers to ''click'' on references and jump directly to the material cited. If your reference citations are incorrect or incomplete (e.g., missing author name, or an incorrect volume number or page), the associated hyperlinks may fail, and the usefulness of your paper in the online environment may be diminished. Since at the present time such links work only from the reference section, work cited anywhere in the paper, including in figure and table captions and in ''Note(s) added,'' should be included in the reference section.

Footnotes to an author's name or address should be limited to those useful for location of, or communication with, an author. Footnotes giving electronic addresses (e.g., email, fax, or Web) of a corresponding author are encouraged. All information concerning research support should appear in the acknowledgments.

Separate **tables** (numbered in the order of their first appearance) should be used for all but the simplest tabular material; they must have captions, which should make the tables intelligible without reference to the text. The structure should be clear, with simple column headings giving all units.

The decision on whether results should be published in long tables depends on the precision of the data, i.e., whether they can be read accurately enough from a figure, and on how many readers are likely to use the numbers relative to the space needed in the journal. Material more extensive than is appropriate for the journal article, or of special types (e.g., color figures, multimedia, program files) may be deposited in the Electronic Physics Auxiliary Publication Service (EPAPS) of the American Institute of Physics; information

regarding EPAPS is available on our Web server. If additional numerical data can be obtained from a data center, from the author, or from another source either as tables or on tape, indicate how and in what format they can be obtained.

Figures should be planned for the column width (8.6 cm or $3\frac{3}{8}$ in.) of the journal. If the detail shown requires it, 1.5 or 2 columns may be used. A note should be left on or with such figures. *Final-journal-size* originals or prints are preferable to oversized originals. Authors are encouraged to submit all figures electronically, even if the text of the manuscript is not submitted electronically; refer to the online instructions for more details. Figures submitted on paper should be of high quality and suitable for digital scanning, which is done at 600 or 1200 dpi depending on the level of detail; original ink drawings or glossy prints are acceptable. Be advised that the scanner reproduces all imperfections (e.g., correction fluid, tape, smudges, writing on the back of the figure, etc.). All figures must be prepared so that the details can be seen after reproduction. They must have a clear background and unbroken lines with as much black-white contrast as possible. The symbol width and lettering height on the journal page should be at least 2 mm. Avoid small open symbols that tend to fill in, small dots and decimal points, and shading or crosshatching that is not coarse enough to withstand reproduction. Curves should be smooth; curves and lines should have consistent line widths of sufficient weight [final weight of at least 0.18 mm (0.5 point)]. The resolution of the drawing software and output device should be set as high as possible (preferably 600 dpi or higher).

Figures should be numbered in the order in which they are referred to in the text. They should be identified on the front (outside the image area) by the number, the name of the first author, and the journal. An indication, e.g., ''TOP,'' of the intended orientation of a figure is helpful, especially in ambiguous cases. Each figure must have a caption that makes the figure intelligible without reference to the text; list captions on a separate sheet. Text should be placed in the caption, not on the figure. Groups of figures that share a (single) caption must be labeled ''(a), (b),'' etc. The figure itself should have properly labeled axes with correctly abbreviated units enclosed in parentheses. Use consistent lettering and style as in the body of the text (use correct capitalization, unslashed zeros, proper exponential notation, superscripts and subscripts, decimal points instead of commas, etc.). Use the form R (10^3 Ω), not $R\times10^3$ Ω. Use half spacing within compound units, not hyphens or periods. Avoid ambiguous usage of the solidus (''/''), e.g., (mb/MeV sr), not (mb/MeV/sr). When possible, integer numbers should be used on the axis scales of figures, e.g., 1, 2, 3, or 0, 5, 10, not 1.58, 3.16, 4.75. Decimal points must be on the line (not above it); do not use commas instead. Use the same number of digits to the right of the decimal point for all numbers on the axis scales. A number must be both before and behind the decimal point, e.g., 0.2, not .2. For complete instructions see the *Physical Review Style and Notation Guide* or the *AIP Style Manual*.

Avoid submitting prescreened prints of photographic material or laser-printed renditions of continuous-tone data; reproduction of such figures is seldom satisfactory and there is a risk of moiré patterns appearing in the final product. If PostScript files are not available, supply glossy or matte-finish photographs or laser prints at the highest resolution possible and in the final published size.

Some figures might be more effective in **color**. This option is available; price schedules can be obtained from our Web server. The cost of publishing illustrations in color, which may be significant, must be borne in full by the respective authors and their institutions. Authors who wish to avail themselves of this option should provide 35-mm slides or transparencies, or high-quality glossy prints, which should be close to the final size expected for publication. (Negatives are not acceptable.) Polaroid color prints should be avoided. Artwork must be flexible. If submitting slides, please note that they will be removed from their jackets for the color separator. In some cases, printing requirements will prevent figures from being located in the most preferred position. To alert readers of monochrome reproductions of the article that the archive figure is in color, begin the caption with ''(Color)''. When submitting electronic figures containing color, please state clearly whether the figures are to be printed in color or monochrome. In the absence of such a statement, the referee may receive a monochrome version of a figure for which color is intended (or vice versa), resulting in confusion and delay. Be advised that production of an editorially accepted paper that contains color can begin only after a properly completed color-illustration authorization form has been received from the authors.

The detail in some figures (such as continuous-tone photographs or color figures) is lost on photocopying. Therefore, duplicate sets of the originals of such figures must be attached to each copy of the manuscript to aid the reviewers.

In order to **reproduce** figures, tables, etc., from another journal, authors must show that they have complied with the requirements of the publisher of the other journal, possibly including written agreement of both publisher and author of the originally published work. (If the original journal is published by APS, only the written agreement of the original author is required to reproduce a few figures or tables.)