

This document provides information for preparing and submitting manuscripts to Part 1 of the Astrophysical Journal (the main journal) and to the Supplement Series. To submit a manuscript to the Astrophysical Journal Letters (Part 2 of the Astrophysical Journal), please see the instructions at <http://www.journals.uchicago.edu/ApJ/ApJLMain.html>.

Papers published in the Astrophysical Journal present the results of significant original research not previously published. Articles submitted to the Journal should meet this criterion and must not be under consideration for publication elsewhere. Authors are advised to examine carefully current issues of the Journal to familiarize themselves with Journal conventions and to note any changes in style before preparing a new paper for submission. In general, Journal style conforms to the Merriam Webster Collegiate Dictionary (10th ed.) and The Chicago Manual of Style (14th ed.). Questions about Journal style should be directed to the manuscript editing office in Chicago (773-753-8021 or apj@journals.uchicago.edu).

1. PREPARATION OF THE MANUSCRIPT

1.1. General

Authors are strongly encouraged to prepare and submit their manuscripts electronically, using the most recent version of the AASTeX macro package. The Astrophysical Journal will also accept manuscripts in Word and WordPerfect. (Please note that Letters manuscripts that are submitted electronically must be formatted in AASTeX.)

These instructions will provide some suggestions regarding the use of AASTeX in preparing papers for the Astrophysical Journal, but for complete documentation authors should consult the AASTeX home page, <http://www.journals.uchicago.edu/AAS/AASTeX>. The AASTeX macro package can be obtained at this address. Further assistance in preparing a manuscript with AASTeX can be obtained by e-mail from aastex-help@as.org. Additional information on preparing manuscripts in Word and WordPerfect can be found on the Astrophysical Journal home page, <http://www.journals.uchicago.edu/msprep-aas.html>. Instructions for the Letters (Part 2) can be found at <http://www.journals.uchicago.edu/ApJ/ApJLInstruct.html>.

Authors are encouraged to submit Encapsulated PostScript (".eps") or PostScript (".ps") files for figures in both electronic and nonelectronic papers, especially for gray scales. Authors should ensure that laser-printed originals of these figures are of high quality and suitable for scanning.

1.2. Style

Papers must be written in English. Authors who are unfamiliar with English should obtain help from colleagues proficient in that language. While a polished literary style is not demanded of scientific papers, they should conform to the elementary rules of grammar, syntax, punctuation, and clarity. Slang and jargon should be avoided.

Observance of the following guidelines will prevent some common errors:

1. All tables and figures must be mentioned explicitly by number and appear in correct numerical order in the body of the text. That is, Tables 1, 2, 3, and 4 must each be mentioned in the text at least once, and the first mention of Table 3 should not precede the first mention of Table 2.

2. The reference list and text citations should agree and be accurate. All references cited in the text must appear in the reference list, and all references listed in the reference list must be cited in the text.

3. Acronyms and abbreviations should be spelled out the first time they are used unless they are common throughout the discipline. Terms defined in the abstract should be defined independently

in the main text.

4. Symbols for chemical elements should be in normal type, not italics. The mass number should precede the symbol, e.g., ^{12}C . Roman numeral designations for spectra of ions should be given in small capitals and preceded by a space, e.g., H II.

5. Standard abbreviations for SI units (e.g., m, km, mm) or natural units (e.g., AU, pc, cm) should be used. If English units such as inches or pounds per square inch are used, metric equivalents should be given in parentheses. Expressions of rate, such as kilometers per second, ergs per meter, etc. should always be set as, e.g., km s^{-1} , ergs m^{-1} , not km/s, ergs/m.

6. Right ascension and declination in text and equations should be given in the following form: $3^{\text{h}}25^{\text{m}}8^{\text{s}}.15$, $90^{\circ}26'14''.5$. In tables, unit symbols for coordinates should not appear in the body of the table, but should either be given in the column heading or be explained in a footnote to the table.

7. Dates should be written in the order: year, month, and day; e.g., 1996 January 1—the month being written in full, except in tables, where the standard three-letter abbreviations for months are used without a period. Universal time designations should be written 22:37:48–22:37:52.5 UT, e.g., (for hours, minutes, seconds).

8. Sentences should not begin with a symbol, number, or lowercase letter.

9. The word "data" is plural and therefore takes a plural verb.

10. Closing quotation marks should follow periods and commas but precede colons and semicolons.

11. In series of three or more items, a comma should be placed before the final item, e.g., "space, time, and matter."

1.3. Manuscript Components

The manuscript should consist of the following elements:

Title page

Abstract and subject headings

Text

Acknowledgments

Appendices (if any)

References

Figures with figure legends (if any)

Tables (if any)

The reference section should begin on a new page. In electronically submitted manuscripts, figures and figure legends may be placed together and figures and tables may be set in the body of the text, preprint style, but separate .eps files must also be provided for each figure. In paper manuscripts, tables, figures, and figure legends should be placed at the end of the manuscript. (Please note that formatting requirements for submission to the Letters are different.)

1.4. Title Page

The following items should be included on the title page:

1. The title of the paper.

2. A short title (not more than 44 characters) to be used as the running header.

3. Name(s) of the author(s), with correct capitalization and diacritical marks. If first and middle names and/or initials are used consistently from paper to paper, all the works by an author will be listed together in the Index.

4. One complete postal address for each author, including zip or country code. A current e-mail address should be provided for each author. Affiliations and complete postal addresses can be listed under authors' names or in footnotes.

5. Footnotes to the title and to the authors' names other than those described in item 4 above.

In AASTeX, the `\footnote{text}` command for footnotes to titles and the `\altaffilmark{key number}` and `\altaffiltext{key number}{text}` commands for footnotes to author names should be used. If an author has more than one affiliation, all key numbers should be placed within the same `\altaffilmark`, e.g., John Smith`\altaffilmark{1,2}`; Jane Jones`\altaffilmark{2,4,5}`. Each key number must point to a separate `\altaffiltext` command. For further AASTeX information see the AASTeX Author Guide § 2.3.

1.5. Abstract

The abstract should concisely summarize the content and conclusions of the paper. The abstract should be a single paragraph of not more than 250 words, and should not contain reference citations.

1.6. Subject Headings

The subject headings (a maximum of six) should be listed after the abstract. The current list of subject headings is printed in the Annual Index to the Journal and is available on-line at http://www.journals.uchicago.edu/ApJ/keywords_text.html.

Note that the `\keywords{text}` command for subject headings must be placed after the `\end{abstract}` command and not before it.

1.7. Section Headings

Sections should be numbered with arabic numerals. Subsections (second-level headings) should be numbered 1.1., 1.2., 1.3., etc. Third- and fourth-level headings should be numbered, e.g., 1.2.1. and 1.2.1.1., respectively. First-level titles (§ 1) and Appendix titles should be in all capital letters; second-, third-, and fourth-level (§ 1.1, § 1.1.1., § 1.1.1.1.) titles should capitalize the first letter of each word, except for articles, conjunctions, and prepositions.

1.8. Footnotes

The Journal discourages extensive use of footnotes. Footnote use should be confined to providing URL addresses, affiliations, or other truly peripheral information, and should not be used for discussions of or expansions on the text.

Text footnotes should be numbered consecutively, starting with those on the title page.

Footnotes to tables should be designated by lowercase letters, in alphabetical order, starting with "a" in each table. (See sample Table below, § 1.11.) Each table should have its own complete set of footnotes, even if some or all of the footnotes are repeated in later tables.

1.9. Mathematics

For convenience of citation of equations, authors are encouraged to number all displayed equations.

Mathematical notation should be consistent throughout the paper. Authors should distinguish between *l* (el) and *I* (one); *O* (capital oh), *o* (lowercase oh), and *0* (zero); ϵ (epsilon), \mathcal{E} (curly epsilon), and \in (the symbol for set membership); *v* (math italic vee) and ν (Greek nu); *k* (italic kay) and κ (Greek kappa); and ϕ (Greek phi) and \emptyset (the symbol for the empty set).

Vectors should be distinguished by boldface italic type (e.g., ***B***); arrows over symbols should not be used to denote vectors. Boldface should also be used to designate vector operations and operators (e.g., $\mathbf{\times}$, $\mathbf{\cdot}$, $\mathbf{\nabla}$). Multidimensional vectors (*n*-vectors) should be lightface italic (not bold). Tensors may be set bold nonitalic if it is necessary to distinguish them from vectors.

Scientific notation should be written with a multiplication sign preceding the power of 10 (e.g., 3.4×10^{-18}); in tables only, if it is desired to conserve space, the form 3.4E-18 may be used. Except in scientific notation and for vectors, multiplication symbols (cross or center dot) should not be used.

Subscripts and superscripts will be aligned unless an order of subscripts and superscripts is explicitly requested by the author in a note accompanying the manuscript. If a specific sequence of subscripts and superscripts is required, e.g., Rhijk or Rjkhi, authors should indicate the correct sequence by a comment in the electronic file or in the margin of a nonelectronic paper at the first occurrence.

Stacked fractions are not permitted in the body of the text or in superscripts (e.g., in-line and superscript fractions should be set as dt/ds , not $\frac{dt}{ds}$). Authors should take care that numerators and denominators of in-line fractions are delimited clearly to avoid any possible ambiguity (i.e., write $[(\log T_s) q]/r$ or $\log [(T_s) q/r]$, not $\log Tsq/r$). In displayed equations, fractions are limited to two levels, i.e.,

$$\frac{\log [T_s (q/r)]^{2/3}}{Q} \text{ is correct, not } \frac{\log [T_s (\frac{q}{r})]_3^2}{Q}. \quad (1)$$

Displayed equations should be centered. If equations are numbered, they should appear in serial order, with the numbers appearing on the right. Equations should not be referred to by their numbers alone; e.g., "substituting in equation (45)" is correct, whereas "substituting in (45)" is not. When an equation is referred to within parentheses, "equation" should be abbreviated to "eq."; thus "(see eq. [45])."

Equations are to be read and punctuated as sentences or parts of sentences.

In AASTeX, for font changes in equations, the scope of the font change must be carefully delimited using braces. In particular, a single font-change command should not begin a formula unless its scope is delimited.

In a displayed equation that indicates a choice between alternatives, as, for example,

$$|x| = \begin{cases} x & \text{if } x \geq 0; \\ -x & \text{otherwise.} \end{cases}$$

authors should use the `\cases` command. In particular, case constructions (as above) and multiline equations should not be set as matrices. See page 175 of *The TeXbook*, D. E. Knuth (1986), for more information.

When using the `\over` command, authors should carefully delimit, with braces, the numerator, the denominator, and the entire `\over` construction; for example, `\{NUMERATOR\over\{DENOMINATOR\}}`. For further AASTeX information, see the AASTeX Author Guide § 2.11.

1.10. Acknowledgments

At the end of the paper individuals, institutions, or funding agencies may be acknowledged. Authors may also acknowledge the referee if they wish. However, it is not appropriate to acknowledge the help of the Scientific Editor or other members of the *Astrophysical Journal* staff.

1.11. References

1.11.1. Citations in Text

References should be cited in text by giving the last name of the author and the date of publication, e.g., (Hale 1929). There is no comma before the date. For papers by two authors, the last names are joined by an ampersand, e.g., (Press & Rybicki 1992). Papers by three authors should list all three authors (Camilo, Nice, & Taylor 1996) at the first citation; all subsequent citations should list the first author followed by *et al.*, e.g., (Camilo *et al.* 1996). Papers by more than three authors should be cited by giving the last name of the first author followed by *et al.* and the date.

References are given in parentheses unless the author's name is part of the sentence, e.g., "the Λ -model (Smoot *et al.* 1992)" but "according to Smoot *et al.* (1992)." If a parenthetical citation cites two or more papers, they should be separated by a semicolon: (Vittorio & Turner 1987; Peebles 1993). If two or more papers by the same author(s) are cited together, the author(s) should be listed once, with the dates of the papers separated by a comma: (Peebles 1982, 1993). Papers by the same author(s) published in the same year should be distinguished by appending *a*, *b*, *c*, etc., to the date: e.g., Paczyński (1995*a*, 1995*b*). Parentheses around the date are omitted for references appearing in a table or in a note to a table.

Electronic catalogs, newsletters, and data sources should be cited in text by author and year and included in the reference list in the same manner as other references, but a footnote should be appended to the first text citation giving the URL (World Wide Web address) of the site.

Authors are encouraged to link citations with the references by using the `\cite-bibitem` mechanism of LaTeX's `thebibliography` environment. For further AASTeX information see the AASTeX Author Guide § 2.12.

1.11.2. Reference List

All sources cited in the text and tables must appear in the reference list at the end of the paper, and all entries in the reference list must be cited in the text. Reference entries should be ordered alphabetically, starting with the last name of the first author, followed by the first author's initial(s), and so on for each additional author. For papers with more than eight authors, the last name and initials of the first author only should be listed, followed by a comma and *et al.* Multiple entries for one author or one group of authors should be ordered chronologically, and multiple entries for the same year (including references with three authors that may be cited in the text as "*et al.*") should be distinguished by appending sequential lowercase letters to the year: e.g., Smith, E., Rowe, T., & Jones, A. B. 1999*a*; Smith, A. B., Thomas, J. R., & Peebles, P. J. E. 1999*b*; Smith *et al.* 1999*c*.

References to papers in preparation, preprints, or other sources generally not available to readers should be avoided if possible.

Reference entries should take the following forms. In all cases, there should be a space between initials of the first name, a comma and ampersand (&) before the last author, no "p." for page number, no final period, and no comma before parenthetical place of publication.

Astrophysical Journal Letters articles should be indicated by an "L" before the page number:

Smith, A. B. 1999, *ApJ*, L21. Letters articles submitted or in press (i.e., where no page number is available) should substitute the journal designation *ApJL* (Smith, A. B. 1999, *ApJL*, 513, in press).

Authors should use LaTeX's `thebibliography` environment to mark up the reference list. The `natbib` package is also acceptable, but only when used with AASTeX version 5.0.

Examples of correct styles for some common reference forms are given below.

Journal article

Martín, E. L., Rebolo, R., & Zapatero Osorio, M. R. 1996, *ApJ*, 469, 706

Author [Last name, First-name initials], Author, & Author. Year, Journal abbreviated title, Volume number, First page of article

Book

Donat, W., III, & Boksenberg, A. J. 1993, *The Astronomical Almanac for the Year 1994*, Vol. 2 (2d ed.; Washington, DC: GPO)

Author [Last name, First-name initials], & Author. Year, Title, Volume if a multivolume work (Edition, if any; City of publication: Publisher)

In the case of a book, note space between initials, comma and ampersand (&) between authors, no comma before parentheses for place of publication, and no page number. Where specific pages are cited, these should be given at the text citation.

Article or chapter in an edited collection

Huchra, J. P. 1986, in *Inner Space/Outer Space*, ed. E. W. Kolb et al. (Chicago: Univ. Chicago Press), 65

Author(s) [Last name, First-name initials]. Year, in Collection Title, ed. Editors by first-name initials followed by last name (City of publication: Publisher), first page of article

Conference proceedings

Salpeter, E. E., & Wasserman, I. M. 1993, in *ASP Conf. Ser. 36, Planets around Pulsars*, ed. J. A. Phillips, S. E. Thorsett, & S. R. Kulkarni (San Francisco: ASP), 345

Author(s) [Last name, First-name initials]. Year, in Conference series title [*ASP Conf. Ser.*, *AIP Conf. Proc.*, *IAU Colloq.*, *IAU Symp.*, etc.] and number, Volume title, ed. Editors by first-name initials followed by last name (City of publication: Publisher), first page of article

Star catalogs

Hoffleit, D. 1982, *The Bright Star Catalogue* (New Haven: Yale Univ. Obs.)

Author(s) [Last name, First-name initials]. Year, Catalog title (City of publication: Publisher)

Electronic newsletter (published only on-line)

In reference list: Hermoso, D. 1996, *ESA IUE Electron. Newsl.* 46

Footnote to text at point of citation: 4EAS IUE Electronic Newsletter (Imhoff 1997) is available at: http://www.vilspa.esa.es/iue/nl/newsl_46.html.

Instrument documentation

Gussenhoven, M. S., Mullen, E. G., & Sagalyn, R. C. 1985, *CRRES/SPACERAD Instrument Description*, Document AFGL-TR-85-0017, Air Force Geophysics Laboratory

Author(s) [Last name, First-name initials]. Year, Title, Document number, Issuing agency

Preprints

Smith, A. B. 1999, preprint (astro-ph/9812345)

Lockwood, G. W., & Skiff, B. A. 1988, *Air Force Geophys. Lab. preprint* (AFGL-TR-88-0221)

Author(s) [Last name, First-name initials]. Year, preprint (preprint series and number)

References to preprints are acceptable only for papers not yet in print. For papers that have

been accepted but are not yet in print, preprint number may be given at the end of a reference submitted or in press [i.e., Smith, A. B. 1999, ApJ, in press (astro-ph/9912345)].

Papers submitted or in press

Wolk, S. J., & Walter, F. M. 1999, ApJ, submitted

Wolk, S. J., & Walter, F. M. 1999, ApJ, in press

Papers submitted but not yet accepted for publication should be listed with the journal and "submitted." Papers accepted for publication should be listed as "in press."

Private communications and papers in preparation

Papers in preparation and information obtained through private communications should be cited in the text but should not be included in the reference list. Citations in the text should give the first-name initials and last name of the author(s), the year (for private communications), and the phrase "private communication" or "in preparation," e.g., (P. J. E. Peebles 1998, private communication; T. Rex, in preparation).

For journal articles, list the short title of the periodical. IAU abbreviations should be used. The following are some acronyms used for frequently cited journals:

<i>A&A</i>	<i>Astronomy and Astrophysics</i>
<i>A&AS</i>	<i>Astronomy and Astrophysics Supplement Series</i>
<i>AJ</i>	<i>Astronomical Journal</i>
<i>ApJ</i>	<i>Astrophysical Journal</i>
<i>ApJS</i>	<i>Astrophysical Journal Supplement</i>
<i>Ap&SS</i>	<i>Astrophysics and Space Science</i>
<i>ARA&A</i>	<i>Annual Review of Astronomy and Astrophysics</i>
<i>AZh</i>	<i>Astronomicheskij Zhurnal</i>
<i>BAAS</i>	<i>Bulletin of the American Astronomical Society</i>
<i>JRASC</i>	<i>Journal of the Royal Astronomical Society of Canada</i>
<i>MNRAS</i>	<i>Monthly Notices of the Royal Astronomical Society</i>
<i>MmRAS</i>	<i>Memoirs of the Royal Astronomical Society</i>
<i>PASJ</i>	<i>Publications of the Astronomical Society of Japan</i>
<i>PASP</i>	<i>Publications of the Astronomical Society of the Pacific</i>
<i>QJRAS</i>	<i>Quarterly Journal of the Royal Astronomical Society</i>
<i>S&T</i>	<i>Sky and Telescope</i>

Authors will be queried for missing, incomplete, or incorrect information in the reference list. It is especially important that authors recheck reference lists after each revision of the text, to be certain that all references cited in the text are in the reference list, and all references given in the reference list are cited.

Manuscripts not prepared in accordance with these guidelines may be returned to authors for correction.

1.12. Tables

For very lengthy tables, authors have the option of publishing a truncated version of the table in the print version of the Journal, with the entire table appearing in the electronic edition. Such

tables are charged at the single-page rate, regardless of total length. (Please note that tables in Letters papers must be printed in their entirety within the limit of four journal pages.)

Tables should be numbered consecutively with arabic numerals and should be cited in the text by number, e.g., "see Table 1." Each table must be mentioned at least once in the text, and in proper numerical order, e.g., the first reference to Table 3 must not occur before the first reference to Table 2. In the printed article, the placement of tables will be determined by their first mention in the text. Tables should not be divided into parts, e.g., related tables should be numbered separately, not given as Tables 3A and 3B. Tables in an appendix may be numbered in the same sequence as the text tables or may begin a new sequence, e.g., Table 9 or Table A1.

All tables are typeset with horizontal rules only; no vertical rules are used. Each table should begin on a new page. Every table should have a concise title. Each column, including the first (stub column), must have a heading. Column headings should label the entries concisely (one or two words); the first letter of each word is capitalized. Units of measurement should be given in parentheses immediately below the column headings, not listed with the data in the body of the table. Secondary information should be incorporated in a note to the table. To indicate the omission of an entry, ellipsis dots (...) are used.

References occurring in the body of a table should be listed by assigning a number to each reference, in consecutive order of citation, with the full citations listed in numbered order in a bibliographic note to the table; e.g., in body of table, the reference column will show a "1, 2" and a note labeled "References.—" at the bottom of the table will read "(1) Smith & Roe 1986; (2) Peebles 1993" (see example in Table 1 below). Citations by names and dates or by acronyms should not be used in the body of the table. All references cited in tables must appear in the Reference list at the end of the paper.

TABLE 1
ORFEUS-I PROGRAM STARS

Identifier	Observation Date	l (deg)	$v \sin i$ (km s ⁻¹)	Reference
HD 200172 ^a	1995 Jul 5	68.1	27	1
HD 149881	1996 Aug 14	31.4	85	1, 2

NOTE.—Program stars at $|z| > 300$ pc.

^a Poor observing conditions.

REFERENCES.—(1) Danly 1989; (2) Jenkins 1978a, 1978b.

1.12.1. AASTeX for Tables

Tables must be marked up using either the AASTeX `deluxetable` environment or the standard `table` and `tabular` environments. Use of `deluxetable` is preferred. If the author uses the `table` environment, there should be only one tabular table per table environment.

For footnotes in tables, authors should use the `\tablenotemark{key letter}` and `\tablenotetext{key letter}{text}` commands rather than superscript letters. For a general note to a table, the `\tablecomments{text}` command should be used. For a list of references to the table, the `\tablerefs{text}` command should be used. When using the `table/tabular` mechanism, the `\tablenotetext{key letter}{text}`,

`\tablecomments{text}`, and `\tablerefs{text}` must be placed after the `\end{tabular}` command but before the `\end{table}` command. When using the `deluxetable` environment, these commands must be placed after the `\enddata` command and before the `\end{deluxetable}` command.

The `deluxetable` environment automatically places the appropriate rules at the top and bottom of the table. Authors who use the `table/tabular` mechanism should use the `\tableline` command for horizontal lines spanning the entire table rather than `\hline` or `\cline`. Two `\tableline` commands should be placed before the column heads, one `\tableline` command after the column heads, and one `\tableline` command after the last line of data. Tables should have no vertical rules.

For further AASTeX information, see the AASTeX Author Guide § 2.14. Corresponding instructions for Word and WordPerfect can be found at <http://www.journals.uchicago.edu/msprep-tables.html>.

1.12.2. Instructions for Submitting Machine-readable Tables

Please use the instructions found [here](#)

1.13. Figure Legends

Figure legends should clearly and concisely label and explain figures and parts of figures. The first sentence of each figure legend should be a descriptive phrase, omitting the initial article (*the, a, an*). In multipart figures, the legends should distinguish (a), (b), (c), etc. components of figure. All lines (solid, dashed, dot-dashed, dash-dotted, etc.) and symbols (filled or open circles, squares, triangles, crosses, arrows, etc.) should be explained in the legend.

In AASTeX, figure legends should be marked up using the `\figcaption{text}` command or the LaTeX figure environment. There should be only one `\figcaption` or figure environment for each legend in the paper (e.g., do not enter Fig. 1a and Fig. 1b as separate `\figcaption` or figure environments).

Figure legends should not be marked up using the `enumerate` environment, the `\noindent` command, or in any markup other than the two listed above. Remember that LaTeX will number figures automatically, so there is no need to key the figure number.

For instructions on combining captions and figures, see the AASTeX Author Guide § 2.13.1. (Please note that formatting requirements for submission to the Letters are different.)

1.14. Manuscripts Not Submitted in Electronic Form

For manuscripts submitted in nonelectronic form, the Journal requires that authors submit two copies of the manuscript and two sets of original illustrations. The manuscript should be prepared with double line spacing throughout, on one side of the page only, on noncorrasable, uncoated $8\frac{1}{2} \times 11$ inch (22 × 28 cm) or A4 paper, with margins of $1\frac{1}{2}$ inches or 4 cm at the sides, top, and end of each page.

Clear copy of both text and figures should be submitted for editing and typesetting. Special typefaces, such as italic, should be reserved for special characters and not used for the main body of the text. Italics should be indicated by underlining if an italic font is not available. If printer's errors result from unclear manuscript pages, costs for corrections will be charged to the author.

Figure legends should be double-spaced; left margins should measure at least $1\frac{1}{2}$ inches.

2. ARTWORK

The production office will use author-supplied electronic art files whenever possible, and authors are encouraged to submit all figures electronically as PostScript or Encapsulated

PostScript files. Electronic figures reproduce at a higher quality than paper figures, which are scanned. Laser-printed hard-copy versions of all figures should also be submitted in case electronic files are unusable and figures need to be scanned. On the back of each hard copy, mark in pencil the figure number and the proper orientation of the figure. Spelling and use of numbers and units in figures should conform to usage in the body of the text and figure legends.

Authors also have the option of having figures appear in black and white in print and in color in the electronic journal, which does not incur the charge of processing and printing the color figure. In this case, authors should submit a black and white PS or EPS file of the figure for the print edition and a color EPS file to appear in the electronic Journal.

A letter detailing any special requests for sizing or arranging figures should accompany submission of the manuscript. The production office in Chicago will do its best to accommodate these requests. Alterations requested after the paper is typeset will result in additional charges to the author. Questions regarding artwork may be directed to the production office in Chicago (apj@journals.uchicago.edu or 773-753-3373).

2.1. Instructions for Submitting Electronic Art Files

Please use the instructions found [here](#).

2.2. Instructions for Preparing Paper Figures

If PS or EPS files for figures are unavailable, the author should submit laser-printed originals of figures for scanning. Figures should be of high quality to ensure accuracy and clarity in the final published version. Artwork should be in good focus, with clean clear numbers and letters and sharp black lines. Thin lines, particularly in figures requiring considerable reduction, should be avoided. Original, professionally drafted artwork may be submitted for reproduction, but freehand-drawn or hand-lettered artwork cannot be accepted for publication. Style points noted in § 2.1 regarding electronically supplied figures apply to paper figures as well.

Halftones supplied as hard copies should be continuous-tone prints, made from original negatives, and printed on a matte coated stock. When photographs include large irrelevant areas, please indicate cropping lines on an overlay.

2.3. Instructions for Color Graphics

Reproduction of color illustrations carries an extra charge. See the latest page charge rates for current color charges (<http://www.journals.uchicago.edu/ApJ/information.html>). As noted above, authors have the option of printing black and white figures that appear in color in the electronic edition of the Journal.

Because of the potential problems with using electronic files for color figures (excessive size, incorrect formats), these figures are primarily scanned from hard copy, creating a proof for author approval and an EPS file for printing and posting. The author should submit two high-quality, continuous-tone color prints, preferably on a matte coated stock, that represent the colors desired for reproduction and is suitable for scanning. If particular areas or colors are significant, please note this in a letter submitted with the manuscript.

If PS or EPS files are submitted intended for reproduction as four-color figures, these files need to be prepared as channelled CMYK (cyan, magenta, yellow, black) files rather than RGB (red, green, blue) files. Most computer-generated figure files are created using the RGB color model, which is used for devices, such as computer monitors, that create color with light. The CMYK system uses the 4 process colors used in printing, and is therefore the necessary format for figure files to be used for printing. Color figures prepared as RGB EPS files can be converted to CMYK,

but because the available color gamut in the RGB model is much larger than the gamut available in the CMYK model, it is very difficult, and sometimes impossible, to match the colors exactly between the two formats. The production office can offer no guarantee as to the quality of color in files that must be converted from RGB to CMYK. It should also be noted that hard copies produced from RGB files by desktop color printers can still contain colors outside of the range of the CMYK palette. Desktop printers may use dyes or wax transfers that create colors that cannot be duplicated by the available CMYK color palette. Color figure files intended for use only in the electronic edition may be submitted as RGB files.

Optimum resolution for CMYK files is 300 dpi, and CMYK EPS files created with PhotoShop seem to produce the best results. Authors are asked to supply two high-quality hard copies whether or not an electronic file is also supplied. The hard copy will be needed for matching if a proof is prepared from an electronic file, or for scanning if the file is unusable. A color proof will be sent to the author for approval.

3. SPECIAL NOTES ON AASTeX

When preparing a manuscript for electronic submission to the *Astrophysical Journal*, authors must follow both the general instructions for AASTeX markup given in "The AASTeX Package for Manuscript Preparation" and the specific instructions given in this section. Below are guidelines for two aspects of AASTeX that frequently cause problems in the printing process. For further and more complete information on AASTeX, see the general instructions available at <http://www.journals.uchicago.edu/AAS/AASTeX>.

3.1. New Commands (Preamble)

Authors may define new commands using `\newcommand`. (Do not use the plain TeX `\def` command.) All author-defined macros should be placed in the document preamble, i.e., before the `\begin{document}`. Since electronic manuscripts are translated into SGML during the production process, it is important to follow certain guidelines when preparing macros. In general, author-defined commands that are abbreviations or shorthands are acceptable, while commands that attempt to define new symbols are not. In particular, do not use any of the following commands in writing macros:

<code>\hskip,</code>	<code>\vskip,</code>
<code>\raise,</code>	<code>\raisebox,</code>
<code>\lower,</code>	<code>\rlap</code>
<code>\kern,</code>	<code>\lineskip,</code>
<code>\char,</code>	<code>\mathchar,</code>
<code>\mathcode,</code>	<code>\buildref,</code>
<code>\mathrel,</code>	<code>\baselineskip.</code>

3.2. Special Symbols

Authors are encouraged to use AASTeX macros for special symbols. Extra symbols are defined for AASTeX, some specifically for an astronomical context, and others more broadly for math and

physics. In particular, the AMS has additional symbol fonts that are available in a standard LaTeX package (*amssymb*).

Authors are advised to consult the symbol tables in the AASTeX manual to see whether a symbol already exists. If it does, the corresponding markup command should be used; these commands are reserved. Authors should not redefine existing command names, since when one of these commands is encountered in an electronic manuscript, the redefinition is ignored when the manuscript is translated.

Authors who need symbols not available in AASTeX should use the symbols available in the AMS fonts collection. Even if the AMS fonts are not installed locally, the macros can be used. The local copy of the manuscript will not contain the fonts, but the copies at the editorial and production offices will be correct.

A complete collection of sample symbol tables, including all of the AASTeX macros as well as some of the AMS fonts that are more interesting for astronomical purposes, can be found in the Symbol Fonts section of the AASTeX Author Guide.

4. EDITED MANUSCRIPTS AND PROOFS

4.1. Manuscripts

Manuscripts are marked for typesetting and edited for grammar, syntax, spelling, punctuation, and conformity to Journal style. Authors of electronic manuscripts will not have copyedited manuscripts returned for their inspection. Instead, if problems or ambiguities are found in the paper, the manuscript editor will contact the author by e-mail or place queries on the page proofs. Replies to these queries should be either made by e-mail or marked legibly on the proofs. If changes or corrections are substantial, the revised portions should be retyped and returned with the proofs.

Revisions that affect the scientific content or results of the paper require the permission of the Editor-in-Chief.

Part I and Supplement papers that are not submitted electronically (i.e., paper manuscripts) will be sent to authors for review after copyediting and before page proofs are set. Letters authors review their papers only at the page proof stage. Further information on the Letters production process can be found at <http://www.journals.uchicago.edu/ApJ/ApJLMain.html>.

When manuscripts are approved for publication, art files are processed, the figures are sized, and the text is converted to SGML for editing. Authors may be contacted while the paper is being edited to resolve any questions that may arise. The SGML files are then sent to the typesetter for further processing and pages proofs are created from these files and are mailed to authors for approval. Author corrections are returned to the production office, all changes are integrated, and the proofs are returned to the typesetter. After one more pass to ensure all corrections have been made, the issue is sent to the printer in PostScript form for printing, and returned to the production office as SGML, PostScript, and PDF for posting the electronic Journal. SGML is converted to HTML, all parts of the electronic Journal are checked by the production office staff, and the issue is posted. For a more detailed explanation of the production process, see the overview at <http://www.journals.uchicago.edu/design/guide/rckguide.html>.

4.2. Proofs

Page proofs are sent directly to the author and should be read thoroughly. Only corrections to typesetting errors and answers to editors' queries on the proofs can be made without charge. Queries from the editor appearing on the proofs should be answered clearly and unambiguously,

and all corrections and added material should be clear and legible.

If the author needs to append material to the text, it should be typed on a separate sheet to be appended to the paper as a "Note Added in Proof." A note added in proof is placed at the end of the paper, following the reference list.

Proofs must be returned within 48 hours. Corrections may also be sent in via e-mail or fax to the address listed in the cover letter sent with the proofs. If an author is traveling, the production office should be informed of the address to which materials are to be sent during the production phase of the paper. If proofs are received after an issue has closed, the paper will be rescheduled to a later issue.

Authors of Letters should send their corrections by e-mail to the address listed in the cover letter on the proofs or by fax (773-753-0827) upon receiving their page proofs. Authors should note that Letters articles are published electronically as soon as proof corrections are received, so authors should take care that corrections when sent are complete.

5. SUBMITTING THE MANUSCRIPT

5.1. Part 1 and Supplements

When submitting a manuscript electronically to the Astrophysical Journal or the Astrophysical Journal Supplement Series, authors should follow the instructions found at <http://www.journals.uchicago.edu/ApJ/Einstruct.html>.

For paper submissions, two copies of the manuscript and two sets of original illustrations should be sent to

Dr. Robert C. Kennicutt, Jr., Editor-in-Chief

The Astrophysical Journal

Steward Observatory

933 North Cherry Avenue

Tucson, AZ 85721-0065

Telephone: 520-621-5145

Fax: 520-621-5153

e-mail: apj@as.arizona.edu

5.2. Part 2 (Letters)

When submitting a manuscript electronically to the Astrophysical Journal Letters, authors should follow the instructions at <http://www.journals.uchicago.edu/ApJ/information.html>.