Astronomical Society of the Pacific Conference Series—Instructions for Authors Using LaTeX 2ε Markup

T. J. Mahoney

Instituto de Astrofísica de Canarias, E-38205 La Laguna, Tenerife, Spain

Enid L. Livingston and Lisa B. Roper

Astronomical Society of the Pacific Conference Series, PO Box 4666, Brigham Young University, Provo, UT 84602-4666 USA

Abstract.   This guide explains step by step how to prepare your article for a proceedings in the ASP Conference Series. It assumes absolutely no prior knowledge of LaTeX on your part; however, if your article involves complicated mathematical expressions or tables, you may need to refer to some of the references listed at the end of this manual. This document is a revised and much extended version of the ASP document `newpaspman.tex` and incorporates the new LaTeX standard LaTeX 2ε (hereinafter, simply LaTeX). Since this document is a manual for occasional reference, information is repeated in those sections where it is needed rather than merely cross-referenced.

1.   General Introduction

In order to ensure that papers received for publication from different authors are consistent in format, style, and quality, authors are required to typeset their manuscripts[1] exactly according to the following instructions. The editors will modify the electronic manuscripts as necessary to ensure that they conform to these standards in order to produce a compliant LaTeX book to be subsquently converted at ASP into a PDF file for electronic publishing.

2.   Why LaTeX?

Traditionally, authors (and editors of multi-author works) would send the typed manuscript of a finished work to a publisher's editor, who would then have the manuscript "marked up" by an editor. The marked-up manuscript would then be passed to a designer, who would choose a typeface and give a distinctive appearance to the printed page (in terms of the formatting of titles, running heads, line spacing, etc.). The manuscript would then be typeset by a compositor and the finished book would then be printed on paper. The computer has

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[1]Although the term *manuscript* has long lost its etymological meaning of "handwritten script", it is retained here in the meaning it has had for many years in publishing, i.e., a document compiled by an author for publication, using whatever means.

now almost completely revolutionized this process to the point where the entire editorial and production process can now be handled totally electronically.

From an author's point of view computers can handle markup, page design and typesetting in two ways:

1. *Visually:* Short or uncomplicated documents are compiled directly on screen so that the final output is immediately displayed. This system, used by word processing packages, is often referred to as "what you see is what you get" (WYSIWYG—pronounced *wisseewig*). Such programs, however, use a large number of invisible and inaccessible commands and can be difficult to adapt to more complex documents, such as scientific papers. While these programs are well-suited to shorter documents, they are ill-equipped to handle the complexity of a complete book.

2. *Logically:* Every aspect of markup, design and typography is decided by user commands in a document keyed in by the author or editor. Although this approach is in principle far more complicated and requires an initial outlay of time in mastering the system, its benefits more than outweigh the advantages for those documents requiring intricate typesetting, cross-referencing and indexing (such as scientific or academic papers, monographs and conference proceedings). By using specially designed templates the burden on the user is considerably reduced: this is the approach adopted by the ASP Conference Series.

LaTeX adopts the logical approach. Authors are given either templates or instructions that provide the basic markup (sections, running heads, etc.) and page design. They then key in their text and formulae, hence acting as their own compositors. To be more specific, standard LaTeX commands do the markup (which is why LaTeX is often referred to as a markup language) and handles document styles, which define the design of the document. Other LaTeX commands are used for keying in the text, but in reality the typography is done by the lower-level language TeX (since all LaTeX commands are in reality small macros consisting of TeX commands). Authors and volume editors don't need to be acquainted with TeX since, as far as their tasks are concerned, LaTeX does it all.

These author instructions are written on the assumption that you know absolutely no LaTeX but are comprehensive enough to ensure that you have sufficient information to prepare even the most complicated text in an acceptable and attractive layout. If you would like further information concerning LaTeX, you might try some of the titles listed in the references at the end of this guide. Lamport (1994) offers a general introduction to LaTeX. For a more comprehensive description, Kopka & Daly (1999) is excellent. Goossens, Mittelbach, & Samarin's *The LaTeX Companion* (1994) offers a more advanced treatment on how LaTeX may be enhanced with various plug-in macros in the public domain. LaTeX is nothing more than a user-(almost)friendly application of the lower-level typesetting language TeX, a full account of which has been published by its creator (Knuth 1986). LaTeX applications are in a continuous state of flux. If you need the latest information on the numerous LaTeX extension packages available in the public domain, you should consult the Comprehensive TeX Archive Network (CTAN) website at

```
ftp://ctan.tug.org/tex-archive/ (USA)
ftp://ftp.tex.ac.uk/tex-archive/ (UK)
ftp://ftp.dante.de/tex-archive/ (Germany)
```

You should also consult `www.tug.org`.

3. LaTeX Markup Commands

To typeset your article you will need the ASP Conference Series LaTeX style file (`asp2006.sty`), this manual, and the author template file (`asptemplate.tex`). These files can be downloaded from the Author's Page on `www.aspbooks.org`. Authors should use the `asptemplate.tex` file as the basis for their contribution. The remainder of this section (§§3.1–3.6) describes the parts of the template file in detail.

You should use only those markup commands from LaTeX plus the several extensions provided by this style file.

> ***Important Note:*** Do *not* define any commands of your own for any reason (no `def` or `newcommand` statements). If you do so, the volume editors will need to remove them all in order to get the book macro to work properly.

If you feel that you need special commands, clear these with the editors, who will need to include any such command definitions in the customized book macro for the volume, to which you will not have access.

Most of the LaTeX you will need is already contained in the template (`asptemplate.tex`). As far as page layout and markup are concerned, you will probably not need anything further than this template since it is quite self-explanatory. However, most articles published in this series of conference proceedings usually contain much more than mere plain text and can reach a high level of complexity. Also, there are minor points of LaTeX related to typography that authors need to be familiar with. For these reasons, we have included the following fairly exhaustive notes, which we hope will answer most questions that are likely to arise in the preparation of your contribution.

3.1. Using the Template

We review here the important components of the `asptemplate.tex` file, which you will use to prepare your manuscript. The first piece of markup in the template declares the overall style of the document:

```
\documentclass[11pt,twoside]{article}
```

This by itself would arrange your text in the standard LaTeX style for articles, which is not what we want. To tailor the text to ASP Conference Series style, `asptemplate.tex` uses the following command:

```
\usepackage{asp2006}
```

The `.sty` extension is understood by the compiler. If you wish to include images in your article, `asptemplate.tex` enables you to call a number of image-plotting routines, the most common ones being `epsf.sty` (for encapsulated postscript files) and `psfig.sty` (for postscript files), both of which will be discussed in what follows. These packages are included in the preamble next:

```
\usepackage{epsf}
\usepackage{psfig}
```

Occasionally, it is necessary to print a figure or table sideways on the page. This "landscape" orientation is made available with the `lscape` environment, which is also invoked in the preamble of `asptemplate.tex` through the command:

```
\usepackage{lscape}
```

To get the running headers at the top of each page (authors' names on the left page and title on the right page), look for the following commands:

```
\markboth{authors' surnames}{title of contribution}

\pagestyle{myheadings}
```

Then fill in the braces with the applicable information, in mixed case text. Use surnames only (no initials). For two authors, put "and" (not an ampersand) between the two authors' surnames; for three authors, separate each author's surname with a comma, with a serial comma and the word "and" (not ampersand) before the last author; for more than three authors write the first author's surname followed by "et al." (with no preceding comma; note the period or stop). Use a shortened version of the full title if necessary. *If the running title is too long it will displace the page number beyond the text margin.*

To ensure any equations, figures, footnotes, section numbers and tables are correctly number from "1" upwards, `asptemplate.tex` uses the following commands (which you should not alter):

```
\setcounter{equation}{0}
\setcounter{figure}{0}
\setcounter{footnote}{0}
\setcounter{section}{0}
\setcounter{table}{0}
```

> ***Important Note:*** No other matter should appear in the preamble, and authors are strongly discouraged from adding their own macro definitions. Any such additions will be removed by the volume editors.

Immediately following the preamble, you will see

```
\begin{document}
```

This command identifies the beginning of the main portion of the manuscript. In LaTeX every `\begin{}` command must be terminated with an `\end{}` command. The main text of your article, including any tables, figures, and the bibliography, must be placed after `\begin{document}` and before `\end{document}` (the final command in the template). Failure to respect this basic rule will result in any matter after the `\end{document}` command being ignored by LaTeX. If your document fails to compile properly, one of the many things to look out for is matter appearing before `\begin{document}` that shouldn't be there.

The rest of this section and all of §4 deal with the main body of the text of your article, including tables, figures and the bibliography.

3.2. Title, Byline, Abstract, and Keywords

So far you have told LaTeX to typeset your article in the ASP Conference Series style and to place the authors' surnames and the abbreviated title of the article as running heads. You are now ready to tell LaTeX to print the article title, authors' names (called bylines in publishing), and addresses. The use of keywords is encouraged, although they will only be used "invisibly" in the electronic version to categorize the articles in the volume for the ADS bibliographical database.

Title of Article   The title will appear in boldface just beneath the eybrow slug on the first page of your article. To typeset the title look for the command

>   \title{*title of article*}

in the template file and replace the text 'title of article' inside the curly braces with the title of your article. Please use mixed case text (initial caps with all nouns capitalized) for all titles, running heads and sections headings. Ensure that the title does not overrun the right-hand margin. To prevent this, you can insert a carriage return command (\\) where you wish to enforce a line break. For example,

>   \title{The Broad- and Narrow-Line Regions of Narrow-Line\\
>   Seyfert 1 Galaxies}

will force LaTeX to put "Seyfert 1 Galaxies" on a separate line (LaTeX should do this without your intervention, but this doesn't always happen).

Please note that there is never a good reason to append a footnote mark to the title of an article. The usual reason why authors like to do this is to indicate that observations were made on such-and-such a telescope using a certain instrument in an observatory run by a given organization, all of which information should rightfully appear in a section describing the observations. Don't strain the reader's patience by making acknowledgements more than once.

Authors' Names and Affiliations   The next line in the template file is the command

>   \author{*Author's name*}

To typeset the authors' names you must replace the text 'Author's name' by the name(s) of (all) the author(s). You should include each author's full name,

unless directed by the volume editors to use initials only with surname. First names or initials must precede the surname. In the case of more than two authors, all from the same institution, the names of the different authors should be separated by commas, with the last name being preceded by "and" (not an ampersand). Please use mixed case text rather than all capitals, and double check that spelling and spacing of all names are correct.

You now need to insert the affiliation(s) of the author(s). The command for doing this in the template is:

> `\affil{`*Author's affiliation(s)*`}`

This is the normal way of typesetting affiliations.

Alternatively, authors' affiliations may also be designated in footnotes. This method (for reasons of simplicity) is not dealt with by the template. The footnote method is recommended for saving space if there is a large number of authors with different affiliations. Authors and editors may wish to consult previous ASP Conference Series volumes for examples. Footnoted affiliations are specified by replacing the `\author` and `\affil` commands above with the following two commands:

> `\author{`*Author's name(s)*`\altaffilmark{`*note #*`}}`
>
> `\altaffiltext{`*same note #*`}{`*Author's affiliation(s)*`}`

With either method, the affiliation should include the full postal address of the author. The address will be broken over several lines automatically if need be; do *not* use LaTeX's `\\` command to force the line breaks unless absolutely necessary. Again, use mixed case text for all author and affiliation fields. Three guidelines are useful for dealing with affiliations:

1. If a superscript is attached to an authors name, it should follow any separating comma, not precede it (for use of superscripts see below).

2. If the authors are from different institutions, list them institution by institution (unless an author has more than one affiliation, in which case see below).

3. If some of the authors have multiple affiliations, it is convenient to use superscripts and list the affiliations in numerical order either immediately below the author list or in footnotes, using the command `\altaffilmark{}`.

These complicated rules are best illustrated by a few examples (taken from volume 249 of the ASP Conference Series).

Example 1:

> A. J. Baker
> *MPI für extraterr. Physik, Postfach 1312, 85741 Garching, Germany*
>
> E. Schinnerer and N. Z. Scoville
> *Department of Astronomy, Caltech 105-24, Pasadena, CA 91125, USA*
>
> P. P. Enlmaier, L. J. Tacconi, L. E. Tacconi-Garman, and N. Thatte
> *MPI für extraterr. Physik, Postfach 1312, 85741 Garching, Germany*

Example 2:

Nino Panagia,[1] Henny J. G. L. M. Lamers,[2] Arjan Bik,[2]
Willem J. de Witt,[2] Salvatore Scuderi,[3] Alessandro Capetti,[4]
Martino Romaniello,[5] Maarco Spaans,[6] and Robert P. Kirshner[7]

⋮

[1] *ESA/STScI, 3700 San Martin Drive, Baltimore, MD 21218, USA*

[2] *Astronomical Institute, Princetonplein 5, NL-3584 CC Utrecht, The Netherlands*

[3] *Catania Astrophysical Observatory, Via Santa Sofia 78, I-95125 Catania, Italy*

[4] *Torino Astronomical Observatory, Strada Osservatorio 20, I-10025 Pino Torinese, Italy*

[5] *European Southern Observatory, Karl-Schwarzschild Strasse 2, D-85748 Garchin-bei-München, Germany*

[6] *Kapteyn Astronomical Institute, PO Box 800, Groningen, The Netherlands*

[7] *Harvard–Smithsonian Center for Astrophysics, 60 Garden Street, Cambridge, MA 02138, USA*

Example 3:

S. Stedman,[1] J. H. Knapen,[1,2] and D. M. Bramich[2]

[1] *University of Hertfordshire, Dept. Physical Sciences, Hatfield, Herts AL10 9AB, UK*

[2] *Isaac Newton Group of Telescopes, Apartado 321, E-38700 Santa Cruz de La Palma, Spain*

The first example needs no comment, but note that for the second example the superscripts were used to save a lot of page space, and that for the final example only superscripts can sort out the problem of multiple affiliation. In the second example, the affiliations can either immediately follow the list of author names or, to save even more space, can be listed as footnotes at the bottom of the page, with footnote size text, as shown here. Use the `\altaffilmark{}` and `\altaffilltext{}{}` commands described above to create footnote affiliations.

Abstract   The abstract should be enclosed in the `abstract` environment.

```
\begin{abstract}
Summary text
\end{abstract}
```

(These commands are in the template file.) Don't include the word "abstract" at the start of your text; it is inserted automatically and will appear in boldface followed by a point. The text of the abstract should run on from this heading (as in the abstract of this manual). Don't leave a blank line between the command `\begin{abstract}` and the first line of your abstract text.

Keywords   Keywords are terms in a top–down hierarchical classification system used for sorting research articles into bibliographical categories.[2] You can include keywords in your manuscript, but they will not appear on the page. Their use will be restricted purely to providing bibliographical data for ADS from the electronic version of the volume. There are several systems of keywords available, but ASP adopts the version used by the major international astronomical journals (A&A, AJ, ApJ, MNRAS, PASP, etc.). You can download this list of keywords from `http://www.journals.uchicago.edu/PASP/keywords.html`. To include keywords in your manuscript, enclose them in the braces of the `\keywords{}` command in the template. For keyword syntax, consult the author instructions of any major international astronomical journal.

3.3.   The Main Text

Dividing Your Text into Sections   You can divide your text into sections, as is done in this manual. The `asp2006` style supports three levels of sectioning.

> `\section{`*heading*`}`
> `\subsection{`*heading*`}`
> `\subsubsection{`*heading*`}`

The first two of these commands will produce numbered section headings in boldface set off from the following text. The third command will produce an unnumbered italicized heading with run-on text. Keep the structure of your text within the three-level hierarchy; if that is not possible, then consult the volume editors, who may have their own preferences. The volume editors may also specify if they wish all authors to use numbered section headings or not. If you (or they) prefer not to have any of your sections numbered you should use the following commands:

> `\section*{`*heading*`}`
> `\subsection*{`*heading*`}`

Please use mixed case text (initial caps) for the section heads. Note that these commands delimit sections by marking the *beginning* of each section; there are no separate commands to identify the *ends*.

For the top two levels of sectioning any mathematical expression should be preceded by the command `\boldmath`, to be written outside the math environment, as shown in the example below. This ensures that the entire heading appears in boldface, hence giving a more professional look to the page. Here is an example of a heading that includes a mathematical expression typeset without using the `\boldmath` command:

> `\section*{Evolution of Elliptical Galaxies to $z = 0.6$}`

will produce

> **Evolution of Elliptical Galaxies to** $z = 0.6$

---

[2]They are *not* meant to serve the purposes of standardization of terminology.

And here is the same example with `\boldmath`:

```
\section*{Evolution of Elliptical Galaxies to \boldmath $z = 0.6$}
```

gives

Evolution of Elliptical Galaxies to $z = 0.6$

Typesetting the Main Text   The first paragraphs in top-level and second-level sections will automatically appear without indentation. That is intentional and conforms to standard publishing practices: please don't alter it. All subsequent paragraphs will be indented. For third-level sections, the first paragraph simply runs on from the section title with no paragraph break; all subsequent sections are indented.

In LATEX, paragraphs are indicated either by the `\par` command or with a double carriage return. Never use the `\\` command to indicate a new paragraph, since this will only start a new line with no indentation, which can be confusing to the reader (and to the editor!).

Text is keyed in in the usual way. Appendix A lists most of the LATEX textual symbols that you will ever need. LATEX will ignore the typist's convention of a double space after points, colons and semicolons, and will adjust the spacing between words and punctuation marks according to its own internal typesetting rules.

Occasionally, you will find that a word will overrun the right text margin; this must be corrected since whatever overshoots the margins will not be printed in the published version. This most often occurs in long technical words or acronyms which LATEX does not know how to split. A simple way of ensuring a break in the middle of a word is to insert `\-` after a syllable where a linebreak is allowed. As an example, possible word breaks in the word "buckminster-fullerene" could be keyed in as follows:

```
buck\-min\-ster\-ful\-ler\-ene
```

Merriam-Webster's Collegiate Dictionary (2000), which all authors and editors working in American English should have at their side, is an excellent guide to correct word division and is also useful in this respect for British English.[3]

If you find the occasional bad word break, you can use

```
\begin{sloppypar} text of paragraph \end{sloppypar}
```

which will switch off the hyphenation for the offending paragraph. Don't overuse the `sloppypar` environment since it may result in some very sparse lines of text. You can also avoid bad word breaks by preceding a phrase with `\sloppy` and following it with the command `\fussy` (which switches `\sloppy` off). If none of these techniques offers an acceptable solution, it might be necessary to redraft the offending sentence.

A word needs to be said about the spacing after points. If a sentence ends with a lower case letter you need do nothing except put the end point (period

---

[3]See Mahoney (2002) for a list of useful aids for authors and editors.

or "full stop"). If, however, a sentence contains an abbreviation that ends in a point but does not end the sentence (a common one being *etc.*), then a backslash or a tilde must link the stop and the following word in order not to leave too large a space between the abbreviation and the word. So for

> `Bloggs et al.  got it wrong.`   →   Bloggs et al. got it wrong.

we should have typed

> `Bloggs et al.~got it wrong.`   →   Bloggs et al. got it wrong.

(the difference in this example is slight but it can be considerable for a particularly dense line of type). Keep a lookout for parenthetical phrases ending in "etc.)": if such a parenthesis occurs in mid sentence you should type `etc.)~` and not just `etc.)`.

A further complication occurs with sentences ending in capitals. LaTeX normally puts an interword—not an intersentence—space after a point preceded by a capital so as not to leave too large a space after initials in a name. You can force an intersentence space by appending the `@` symbol to any stop preceded by a capital. Hence write

> `I love vitamin C.@ It starts the day off right.`

to get the correct spacing between the point and the capital starting the next sentence.

Regarding vertical spacing, the `\vspace` command should not be used by authors to squeeze in a few more lines of text, as it will probably cause problems when added to the entire volume. Rewrite portions of the paper, if necessary, to stay within page limitations. Similarly, text that has been commented out in the LaTeX file can "reappear" when viewed in a different text editor. Authors must delete that commented-out text before sending the manuscript to the editor. Avoiding or removing LaTeX customizations and adjustments will make the editor's tasks much easier.

LaTeX 2_ε organizes fonts according to *shape*, *series*, and *family* (see Table 1). Font types can be invoked either as *commands* (which can also be used to insert normal text into equations, etc.) or as *declarations* (which cannot be used in mathmode); in other words, for ordinary text use the declarations and for mathmode use the commands, as shown in Table 1. If you happen to change fonts in a paragraph, remember to enclose the declaration in curly brackets so that the declaration does not overspill into the rest of the text.

Font size can be changed with the commands in Table 2. In `asp2006` style, `\normalsize` is 11 pt, and the other sizes scale accordingly.

> **LaTeX Booby Trap Warning:** Never type "%" on its own. Doing so will remove whatever follows it until the next carriage return. If you want to write, say, 10% you must insert a backslash (\) before the "%" symbol.

Table 1.   Typefaces in LaTeX 2_ε

Command	Declaration	Both will give:
\textup{}	\upshape	Upright text
\textit{}	\itshape	*Italics*
\textsl{}	\slshape	*Slanted text*
\textsc{}	\scshape	SMALL CAPS
\textmd{}	\mdseries	A medium-weight typeface
\textbf{}	\bfseries	**Boldface**
\textrm{}	\rmfamily	Roman type
\textsf{}	\sffamily	Sans serif type
\texttt{}	\ttfamily	Typewriter type

Table 2.   LaTeX commands for changing font size

Command	Size
\tiny	Tiny
\scriptsize	Scriptsize
\footnotesize	Footnotesize
\small	Small
\normalsize	Normalsize
\large	Large
\Large	Larger
\LARGE	Larger still
\huge	Yet larger
\Huge	Huge

If you accidentally let a lone % symbol loose in the text and then carry on typing away merrily without hitting the carriage return, you will end up with a large chunk of missing text and it might not be overly obvious why. If you find text mysteriously disappearing, it might be a good idea to do a search for lone % symbols (remembering to insert a blank space before the % symbol in your search tool).

Acknowledgements   If you wish to have an acknowledgements section, use the command

        \acknowledgements

in the template file. The text should follow after pressing the space bar once. So write simply,

        \acknowledgements We thank the Big Bang for making
        this symposium possible.

to produce:

> **Acknowledgements.** We thank the Big Bang for making this symposium possible.

This will separate the acknowledgements from the previous section with a section division spacing and indent the word *Acknowledgements* in boldface. Do *not* use `\section{Acknowledgements}` to create an acknowledgements section (it does not warrant and should not have full section status).

3.4.   Mathematics

LaTeX can produce highly sophisticated pages of mathematics, but most authors will be able to get by with a very limited subset of LaTeX commands. The most common LaTeX mathematical commands are listed in Appendix B, and a number of useful macros for expressions frequently found in astronomy are listed in Appendix C. If your paper involves a lot of mathematics, then you should obtain a copy of Leslie Lamport's *LaTeX User's Guide and Reference Manual* (Lamport 1994), which caters to the most common mathematical typesetting needs of authors. A more detailed discussion of LaTeX mathematical typesetting is given in Kopka & Daly (1999). For an exhaustive discussion of the general principles of typesetting mathematics, consult the *Chicago Manual of Style* (University of Chicago Press 1993).

The most common typesetting failings of authors are:

- Not putting mathematical variables and constants in italics, both in displayed equations and in the text itself. You should write, for example,

$$t_0 = \frac{3(t_1 + t_2 + t_3 + t_4) \pm \sqrt{H}}{12}$$

and not

$$\mathrm{t_0 = \frac{3(t_1 + t_2 + t_3 + t_4) \pm \sqrt{H}}{12}}$$

- Haphazard use of enclosures (parentheses, brackets, etc.). As a general rule, try to follow the scheme recommended in *The Chicago Manual of Style*:

$$\Big\{ \Big[\Big(\{ [(\quad)] \} \Big) \Big] \Big\}$$

Displayed equations can be typeset in many ways using the standard displayed math environments of LaTeX; these three are probably of greatest use:

```
\begin{displaymath}
\end{displaymath}
\begin{equation}
\end{equation}
\begin{eqnarray}
\end{eqnarray}
```

The `displaymath` environment will break out a single, unnumbered formula. The same effect can be obtained by enclosing the mathematical expression in the double dollar sign (`$$ . . . $$`) or inside the delimiters `\[ . . . \]`. The equation will appear the same if it is set in an `equation` environment, and it will be autonumbered by LATEX. So

```
\begin{equation}
{\mathbold\nabla g\cdot T} = \frac{\partial g}{\partial x}
\left( -\frac{\partial f}{\partial y}\right) +
\frac{\partial g}{\partial f}\frac{\partial f}{\partial x}
= \frac{\partial (f,g)}{\partial(x,y)}
\end{equation}
```

will produce:

$$\nabla g \cdot \mathbf{T} a = \frac{\partial g}{\partial x}\left(-\frac{\partial f}{\partial y}\right) + \frac{\partial g}{\partial f}\frac{\partial f}{\partial x} = \frac{\partial(f,g)}{\partial(x,y)} \tag{1}$$

and the same equation typeset in the `displaymath` environment will suppress the equation number.

In order to set several formulae in which vertical alignment is required, use the `eqnarray` environment. This environment will automatically number each line of the equation. If you want only certain lines numbered, then you can suppress the numbering of a given line by typing `\nonumber` after it. Use `eqnarray*` if you wish to avoid all numbering. Here is an example of the `eqnarray` environment in use:

```
\begin{eqnarray}
\int\!\int\limits_R\!\int_R f\,dx\,dy\,dz & = &
\int\limits_{0}^{1}\int_{0}^{x^2}\int\limits_{0}^{x+y}
(2x - y -z) dx\,dy\,dz\nonumber\\
& = & \frac{3}{2}\int\limits_{0}^{1}\int\limits_{0}^{x^2}
\left(x^2 - y^2\right)\,dy\,dz\nonumber\\
& = & \frac{3}{2}\int\limits_{0}^{1}
\left(x^4 - \frac{x^6}{3}\right)\,dx\nonumber\\
& = & \frac{8}{35}.
\end{eqnarray}
```

would produce

$$
\begin{aligned}
\iiint\limits_{R} f \, dx \, dy \, dz \;\; &= \;\; \int\limits_{0}^{1}\int\limits_{0}^{x^2}\int\limits_{0}^{x+y} (2x - y - z) \, dx \, dy \, dz \\
&= \;\; \frac{3}{2}\int\limits_{0}^{1}\int\limits_{0}^{x^2} \left(x^2 - y^2\right) dy \, dz \\
&= \;\; \frac{3}{2}\int\limits_{0}^{1} \left(x^4 - \frac{x^6}{3}\right) dx \\
&= \;\; \frac{8}{35}.
\end{aligned}
\tag{2}
$$

If you need to equate a single-line expression to a multiple-line expression, or matrices and determinants, then you will need the `array` environment. Here are some examples of the `array` environment at work:

Expression involving multiple lines in a single-line equation:

```
\[
Y_l^m(\theta,\phi)
= \sqrt{{\frac{2l+1}{4\pi}}\frac{(l-|m|)!}{(l+|m|)!}}
P_l^{|m|}(\cos \theta)e^{im\phi}\times \left\{
\begin{array}{ll}
(-1)^m & \mbox{for $m \ge 0$}\\
1      & \mbox{for $m < 0$}
\end{array}
\right.
\]
```

produces

$$Y_l^m(\theta,\phi) = \sqrt{\frac{2l+1}{4\pi}\frac{(l-|m|)!}{(l+|m|)!}}P_l^{|m|}(\cos\theta)e^{im\phi} \times \left\{ \begin{array}{ll} (-1)^m & \text{for } m \geq 0 \\ 1 & \text{for } m < 0 \end{array} \right.$$

The `ll` argument indicates that the elements of the array are to be left justified. Other justifications are right justified (`r`) and centered (`c`). The expression `\right.` (the point is there intentionally) indicates that the right brace should be invisible.

Matrices and determinants:

```
\[
\left(
\begin{array}{cc}
a_{11} & a_{12}\cdots a_{1n}\\
a_{21} & a_{22}\cdots a_{2n}\\
\vdots & \vdots\hfil\ddots\hfil\vdots\\
a_{n1} & a_{n2}\cdots a_{nn}
\end{array}
\right)
\left(
\begin{array}{c}
x_1\\
x_2\\
\vdots\\
x_n
\end{array}
\right) =
\left(
\begin{array}{c}
h_1\\
```

```
H_2\\
\vdots\\
h_n
\end{array}
\right)
\]
```

gives

$$\begin{pmatrix} a_{11} & a_{12} \cdots a_{1n} \\ a_{21} & a_{22} \cdots a_{2n} \\ \vdots & \vdots \ddots \vdots \\ a_{n1} & a_{n2} \cdots a_{nn} \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{pmatrix} = \begin{pmatrix} h_1 \\ h_2 \\ \vdots \\ h_n \end{pmatrix}$$

and

```
\begin{eqnarray*}
I_b & = & \frac{\left|\begin{array}{ccc}
-(R_1 + R_3) & -V & R_3\\
     R_1    &  0 & R_5\\
    -R_3    &  0 & R_3 + R_4 + R_5
\end{array}\right|}{\left|\begin{array}{ccc}
-(R_1 + R_3)    &        0       &       R_3\\
     R_1        & -(R_1 + R_2 + R_5) & R_5\\
    -R_3        &      -R_5       & R_3 + R_4 + R_5
\end{array}\right|} \\
     & = & \frac{VR_5R_3 + VR_1(R_3 + R_4 + R_5)}{\Delta}
\end{eqnarray*}
```

gives

$$I_b = \frac{\begin{vmatrix} -(R_1 + R_3) & -V & R_3 \\ R_1 & 0 & R_5 \\ -R_3 & 0 & R_3 + R_4 + R_5 \end{vmatrix}}{\begin{vmatrix} -(R_1 + R_3) & 0 & R_3 \\ R_1 & -(R_1 + R_2 + R_5) & R_5 \\ -R_3 & -R_5 & R_3 + R_4 + R_5 \end{vmatrix}}$$

$$= \frac{VR_5R_3 + VR_1(R_3 + R_4 + R_5)}{\Delta}$$

To incorporate a mathematical equation or expression into a line of text, enclose it with either the \(. . .\) or the single $ signs (the double dollar signs, $$, would create an unnumbered displayed equation). When typesetting in a line of text such mathematical expressions as

$$\frac{x}{a} + \frac{y}{4a},$$

use the solidus (/) to produce $x/a + y/(4a)$. Using the solidus avoids uneven line spacings. Note also that the \(. . . \) delimiter automatically takes care to force integral and summation limits to fit the text line; hence,

```
\( \( f(x) = A_0 +
\Sigma_{n = 1)^{\infty}\left\{ a_n \cos nx +
b_n \sin nx \right\}
\)
```

will produce $f(x) = A_0 + \Sigma_{n=1}^{\infty}\left\{a_n \cos nx + b_n \sin nx\right\}$ to fit into a line of text without causing extra line spacing.

3.5. Tables

Keep the layout of your tables as simple as possible, with single horizontal rules above and below the column headings and a third horizontal line at the bottom of the table; don't use vertical rules for separating the columns. Physical units in the column heads should appear in parentheses beneath the parameter. The caption goes at the top of the table. For single-sentence captions there should be no stop. Here is a simple table, followed by the LaTeX code to produce it:

Table 3.   A simple table

Component	Velocity [km s^{-1}]	$N_{\mathrm{O\,VI}}$ [cm^{-2}]	N_{H} [cm^{-2}]	Covering factor
1	-1352	1.7×10^{15}	9.0×10^{14}	1.0
2	-599	4.1×10^{15}	2.1×10^{15}	0.9
3	-792	2.1×10^{15}	1.7×10^{15}	0.7
4	-1029	6.0×10^{15}	2.3×10^{15}	0.5

```
\begin{table}[!ht]
\caption{A simple table}
\smallskip
\begin{center}
{\small
\begin{tabular}{ccccc}
\tableline
\noalign{\smallskip}
Component & Velocity & $N_{\mathrm{O\, VI}}$
& $N_{\mathrm{H}}$ & Covering factor\\
         &[km s$^{-1}$]& [cm$^{-2}$]& [cm$^{-2}$]& \\
\noalign{\smallskip}
\tableline
\noalign{\smallskip}
1 & $-1352$ & $1.7 \times 10^{15}$ & $9.0 \times 10^{14}$ & 1.0\\
2 & $-599$  & $4.1 \times 10^{15}$ & $2.1 \times 10^{15}$ & 0.9\\
3 & $-792$  & $2.1 \times 10^{15}$ & $1.7 \times 10^{15}$ & 0.7\\
4 & $-1029$ & $6.0 \times 10^{15}$ & $2.3 \times 10^{15}$ & 0.5\\
\noalign{\smallskip}
\tableline
\end{tabular}
}
```

```
\end{center}
\end{table}
```

The `\begin{table}[!ht]` and `\end{table}` commands float the table in the document, the `[!ht]` argument causing the table to be put either at the top of the page or closest to the point in the text where these commands are invoked. The `\caption{}` command placed right after the `\begin{table}` command puts the caption above the table, which is ASP house style. The `\smallskip` command inserts a small space between the caption and the table. The commands `\begin{center}` and `\end{center}` center the table between the left and right margins (although the caption remains uncentered in this sense). The table proper begins with the declaration `\begin{tabular}{ccccc}`, which starts the `tabular` environment. The five "c"s will create five centered columns. Horizontal rules are drawn using the command `\tableline`. In order to prevent the following text from being printed too close to this line you need to insert a small vertical space with the command `\noalign{\smallskip}`; the `\noalign{}` command is necessary inside the `tabular` environment. The column entries are separated by an ampersand and a carriage return `\\` must be placed at the end of each row in the table.

To subdivide column headings use the `\multicolumn{}{}{}` command, as in the following example:

Table 4.   A more complicated table

Target	Type	$v \sin i$ [km s^{-1}]	
		Measured	Adopted
BH Cep	HAe/Be	$97 \pm 8(8); 97 \pm 5(7); 98 \pm 6(11)$	97
49 Cet	Vega-like	$183 \pm 9(4); 187 \pm 4(3)$	186
⋮	⋮	⋮	⋮
HD 233517	Vega-like	$17 \pm 3(5), 16 \pm 2(6); 15 \pm 2(24)$	15

This table was produced with the following LATEX code:

```
\begin{table}[!ht]
\caption{A more complicated table}
\smallskip
\begin{center}
{\small
\begin{tabular}{llll}
\tableline
\noalign{\smallskip}
Target & Type & \multicolumn{2}{c}{$v\sin i$ (km s$^{-1}$)}\\
\noalign{\smallskip}
\cline{3-4}
\noalign{\smallskip}
```

```
          &       & Measured & Adopted\\
\noalign{\smallskip}
\tableline
\noalign{\smallskip}
BH Cep & HAe/Be &97 $\pm$ 8(8); 97 $\pm$ 5(7);
98 $\pm$ 6(11) & 97\\
49 Cet & Vega-like & 183 $\pm$ 9(4);
187 $\pm$ 4(3)& 186\\
$\vdots$ & $\vdots$ & $\vdots$ & $\vdots$\\
HD 233517 & Vega-like & 17 $\pm$ 3(5), 1
6 $\pm$ 2(6); 15 $\pm$ 2(24) & 15\\
\noalign{\smallskip}
\tableline
\end{tabular}
}
\end{center}
\end{table}
```

The three arguments for the `\multicolumn{}{}{}` command are: 1) the number of columns over which the entry is spread, 2) column alignment (l = left justified, r = right justified, and c = centered), and 3) text.

Note the use of the `\cline{3-4}` command to draw a horizontal rule for the third and fourth columns only. It is also preceded and followed by

```
\noalign{\smallskip}
```

in order to avoid a cluttered appearance.

LaTeX can produce tables of any degree of complexity and it would take many pages to describe all the possibilites here. For further information on tables, refer to Kopka & Daly (1999). There should be only one table per environment.

Finally, here is an example of a landscape table.

```
\begin{landscape}
\begin{table}[!ht]
\caption{A table in landscape mode}
\smallskip
\begin{center}
{\small
\begin{tabular}{lcccccccc}
\tableline
\noalign{\smallskip}
{\itshape IRAS} name& $z$ & Type & FWHM &
\multicolumn{2}{c}{Colors in 1$\arcsec$} &
\multicolumn{2}{c}{for 1000 K dust}\\
&&&[kpc] & $J-H$ & $H-K$ & $A_V$ & $f_K$\\
\noalign{\smallskip}
\tableline
\noalign{\smallskip}
```

```
00150+4937 S & 0.148 & ? & 1.11 & 1.13 &
 1.06 & 4.61 & 0.40\\
$\vdots$&$\vdots$&$\vdots$&
$\vdots$&$\vdots$&$\vdots$&$\vdots$&$\vdots$\\
12112+0305 NE & 0.073 LINER & $<0.48$ & 1.06 &
0.97 & 4.00 & 0.45\\
\noalign{\smallskip}
\tableline
\end{tabular}
}
\end{center}
\end{table}
\end{landscape}
```

Mahoney, Livingston and Roper

Figure 1.   A table in landscape mode

IRAS name	z	Type	FWHM [kpc]	Colors in 1″ $J - H$	$H - K$	for 1000 K dust A_V	f_K
00150+4937 S	0.148	?	1.11	1.13	1.06	4.61	0.40
…	…	…	…	…	…	…	…
…	…	…	…	…	…	…	…
…	…	…	…	…	…	…	…
…	…	…	…	…	…	…	…
…	…	…	…	…	…	…	…
…	…	…	…	…	…	…	…
…	…	…	…	…	…	…	…
…	…	…	…	…	…	…	…
…	…	…	…	…	…	…	…
…	…	…	…	…	…	…	…
…	…	…	…	…	…	…	…
…	…	…	…	…	…	…	…
…	…	…	…	…	…	…	…
12112+0305 NE		LINER	< 0.48	1.06	0.97	4.00	0.45

3.6. Figures

Copyrighted Images   If a figure has been previously published, you must receive written permission from both the original publisher and author to use the image in your paper. At the end of the figure caption include a complete acknowledgement of the source, including that it is used by permission. Information such as publisher, author, volume number, page number and who holds the copyright should all be included. A "Permission to Use" form and sample acknowledgements are available on the Author's Page at `www.aspbooks.org` for your convenience.

Directory Structure   Editors sometimes encounter pathnames that they cannot access (e.g., the author's home directory). Please keep all your files in the same directory to avoid the pathname problem.

Image Size   Please ensure that the size of your figures is not below the limit of legibility. All text in figures must be readable at a 10% reduction. Please also ensure that your figures have no surrounding white margins: your figures should be cropped for the removal of all such margins. Images must also fit within the text margins (5.25 inches, 13.4 cm). See *Size of Illustrations* below for help with help with large images.

Resolution   For a minimum quality print of the image, the figure should be submitted with a resolution greater than 266 ppi (pixels per inch). Bear in mind that line (i.e., purely black and white) diagrams (graphs, etc.) must be of a suitably higher resolution (e.g., 800 ppi) to avoid pixelation (jaggedness).

Hairlines in graphs, charts and other illustrations do not reproduce well; use a minimum .25 point (0.0035 in.) line weight. Also, ensure that contour lines will not run together with a 10% reduction.

For line illustrations use vector diagrams instead of scanning a previously published line diagram wherever possible. If you do decide to scan, say, a graph, ensure that all text, especially physical units, are legible with a 10% reduction. See also the subsection on font conversion for information on fonts in vector diagrams.

For more complete information on image types, resolution, size and color, please see the following technical information from our printer:

> Digital Art Guidelines:
> `http://dx.sheridan.com/guidelines/digital_art.html`
>
> Resolution information:
> `http://dx.sheridan.com/advisor/effective_resolution.html`
>
> Color information:
> `http://dx.sheridan.com/advisor/cmyk_color.html`

Photographs   Photographs should be saved or scanned in `.eps` format, must be scaled and positioned to fit within margins and must be of sufficiently high resolution (266-600 ppi) to reproduce well. Remember that captions should describe the photo in black and white unless paying for color printing.

Color   ASP Conference Series books are printed in black and white, with exceptional use being made of color where the author or author's institution is prepared to pay for this. Color images may be printed in color at a cost of $975.00 for the first image in the volume and $500.00 for each additional image. Contact the volume editor for questions regarding printing images in color. ASP does offer authors free color reproduction in the electronic version of the volume which will be available at `www.aspbooks.org`. If an image is available in color, authors should submit the color image. The color will be retained on the website but converted to grayscale for the printed volume, unless the author has paid for color printing.

When converted to grayscale, many colors tend to appear the same. For example, dark shades of red, green and blue will all appear as black in a grayscale image. Yellow may become white. If this will cause confusion, it may be best to redo the image or pay for color printing. If concerned about the conversion to grayscale, an author should submit an acceptable grayscale image, clearly named, along with the color image.

A problem can arise when an image is to be printed out in color. The computer screen uses the three-color model of Red, Green, Blue (RGB). When color is printed, the four-color model of Cyan, Magenta, Yellow, and Black (CMYK) is used. The results in the colors are slightly different. The change is barely noticeable with photographs, but other graphics will be greatly affected. Figure 1 shows the difference (which is more clearly seen on screen). If authors are concerned about these tonal shifts, they should submit images created in CMYK.
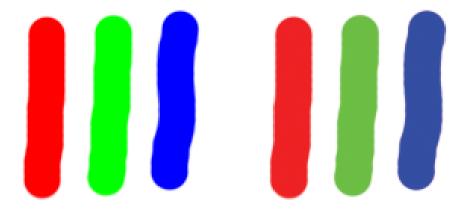
Figure 1.   *Left:* RGB model. *Right:* The same in CMYK. Note that the figure in CMYK is not as bright.

Color Figure Captions   Authors need to bear in mind, when submitting a color image for the electronic version only, that since the book will be printed in black and white, they need to provide a caption that works equally for both the color and grayscale versions.

Font Conversion   Another issue we come across is the use of Type 3 fonts within figures. The use of this type of font results in unpredictable results at the printer. Type 3 fonts are used as the default for dvips. To use the correct type (Type 1) when using dvips, add the option -Ppdf to dvips. A command might look like the following:

```
dvips -Ppdf figure.dvi
```

Figure Placement in Text   The two graphics packages `psfig.sty` and `epsf.sty` should be in your preamble (see §2.1). To place a figure in the text, invoke the `figure` environment with the command

```
\begin{figure}[!ht]
```

(`[!ht]` ensures that the figure is placed either close to where you call it or that it goes to the top of the page). As with all `\begin{}`-type commands, you must remember to close it with

```
\end{figure}
```

ASP style supports three tools for inserting figures, depending on the complexity of the task:

- `\plotone{`*filename*`}`, which plots a single image;

- `\plottwo{`*filename1*`}{`*filename2*`}`, which plots two figures side by side; and

- `\plotfiddle{`*file*`}{`*vsize*`}{`*rot*`}{`*hsf*`}{`*vsf*`}{`*htrans*`}{`*vtrans*`}`, which, as the name suggests, allows you to "fiddle" the illustration into position.

If possible, use `\plotone` or `\plottwo` for simplicity and to avoid editorial complications later. If `\plotfiddle` is needed for exact placement of a figure, the arguments of `\plotfiddle{`*file*`}{`*vsize*`}{`*rot*`}{`*hsf*`}{`*vsf*`}{`*htrans*`}{`*vtrans*`}` are as follows:

vsize	vertical white space to allow for plot, any valid LaTeX dimension
rot	rotation angle, in degrees, counter-clockwise
hsf	horizontal scale factor, percent
vsf	vertical scale factor, percent
htrans	horizontal translation, in points (in printer's jargon there are 72 points to the inch)
vtrans	vertical translation, in points

In ASP style, the figure captions must appear below the figures. Also, please note that the caption will be centered under the pair of graphics when `\plottwo` is used. It is not possible to caption the two plots individually with this package (neither is it ASP style to do so).

As with tables, figures will automatically be identified with arabic numerals, e.g., "Figure 1".

*The **graphicx** Package*   Given our authors' widely varying degrees of familiarity with LaTeX we feel that the \plotone, \plottwo, and \plotfiddle commands will serve most purposes. However, those who are more *au fait* with LaTeX might wish to use the graphicx package. This package enables the user to wield far greater control over the importation of graphics into a .tex file and, apart from the usual sizing and rotational facilities, also enables the user to crop or trim an image as desired (e.g., to get rid of surrounding blank margins). The trimming facility is useful if you need to use only a part of a complete image. For an example of a how to use and manipulate graphicx-imported images and the trimming facility, see the document *How to Use the **graphicx** Package* (Mahoney 2005).

Pasted in Illustrations

> ***Important Note:*** Now that ASP has moved to electronic publishing, pasted in illustrations are no longer acceptable in the final version of the volume manuscript. Although future volumes, apart from being available electronically, will continue to be printed on paper, the printing process itself now relies exclusively on electronic input. The following instructions, however, may be of use for intermediate versions of your paper if there are temporary problems in getting the figure to compile properly.

Illustrations may be inserted physically in the text at the appropriate places, with the relevant caption underneath each. The finished pages are reduced by 10% before printing. Thus, illustrations will appear somewhat smaller in print.

These illustrations should appear in figure environments.

```
\begin{figure}
\vspace{dimen}
\caption{text}
\end{figure}
```

Space for the figure is created with the \vspace command; *dimen* should be a valid LaTeX dimension, e.g., "2.5in".

Size of Illustrations   The maximum width of an illustration is 13.4 cm (5.25 in) so that it will fit within the width of the text area. Of course, an illustration may be smaller if appropriate. A large illustration may be placed sideways ("landscape") on the paper if necessary. This is done using the same procedure as for landscaped tables; i.e., \begin{figure} must be *preceded* by \begin{landscape} and \end{figure} must be *followed* by \end{landscape}.

4.   References

4.1.   In the Text

The reference system to be followed is the standard author–year system. We adopt the editorial convention of not italicizing the phrase "et al."

Single Author   Author name followed by the year in parentheses, as in Abt (1990), or author and year both in parentheses (Abt 1990).

Two Authors   Author names separated by an ampersand (no comma). *Not* to be abbreviated subsequently to "Author1 et al." In parentheses use "(Author1 & Author2 1999)".

Three Authors   When first mentioned in text use the format "Author1, Author2, & Author3 (year)" (note serial comma before ampersand). Subsequently, abbreviate to "Author1 et al.". When authors and year are both within parentheses use "(Author1, Author2, & Author3 1999)" or "(Author1 et al. 1999)".

More than Three Authors   Use the format "Author1 et al.". Please do not use "Author1, Author2, Author3, et al.", since Authors 2 and 3 will be deleted during the copy editing! In parentheses: "(Author1 et al., 1999)".

Citing Multiple Works   Inside parentheses, citations are separated by a semicolon: "(Biretta, Lo, & Young 1982; Forrest et al. 1987; Lee 1995)".

Outside of parentheses, use commas: 'According to Biretta, Lo, & Young (1982), Forrest et al. (1987), and Lee (1995), there is strong evidence to suggest that . . .'.

4.2.   Reference List

The *bibliographic information* should be in the order directed by Abt (1990): author, year, journal, volume, and page. For instance, the reference for this editorial would be typed in as

```
Abt, H. 1990, ApJ, 357, 1
```

Note that there is no comma following the author name(s), there is no trailing period at the end of the reference, and the entire line is set in the body typeface (*no* font changes).

Please note the order of the bibliographical information in the following entries:

```
Biretta, J. A., Lo, K., & Young, P. J. 1982 in AIP Conf.
Proc., 83, The Galactic Center, ed. G. R. Riegler & R. D.
Blandford (New York: AIP), 91

van der Kruit, P. C., & Shostak, G. S. 1983, in IAU Symp.
100, Internal Kinematics and Dynamics of Galaxies, ed. E.
Athanassoula (Dordrecht: Reidel), 69

Garcia-Lorenzo, B., Mediavilla, E., Arribas, S., & del
Burgo, C. 1998, in ASP Conf. Ser. Vol. 152, Fiber Optics
in Astronomy III, ed. S. Arribas, E. Mediavilla \& F.
Watson (San Francisco: ASP), 185
```

Care should be taken that each literature citation in the manuscript has its counterpart in the reference list and vice versa. Care should also be given to checking the accuracy of the references—author(s), date, volume, and page

number. While the accuracy of the references is the sole responsibility of the author(s), the editor(s) should nevertheless aim to ensure uniformity of presentation throughout the volume.

4.3.   LATEX Markup of References

Referencing in a text consists of *citations* in the body of the text of *sources* listed in the bibliography at the end of the text. Although LATEX permits various ways of citing and listing bibliographical references, we would strongly urge authors to use either the `thebibliography` environment, which is described in detail below, or BIBTEX.[4] The environment is admittedly complex, but it will maintain consistency and save you from making mistakes, particularly if you are citing a large number of references; furthermore, it will cut down on the editorial chores of getting your paper into final shape for the proceedings volume.

The `thebibliography` *Environment*   In standard LATEX this environment does not support the author–year system, so it is necessary to invoke Patrick W. Daly's `natbib.sty`; this is done automatically when you compile your LATEX file. The following examples illustrate how two commands, `\citet{}` and `\citep{}`, meet most bibliographical needs (a sample `thebibliography` list is given at the end of this section):

```
\citet{knu86}              ⟶   Knuth (1986)
\citep{knu86}              ⟶   (Knuth 1986)
\citet*{goos94}            ⟶   Goossens, Mittelbach, & Samarin (1994)
\citep*{goos94}            ⟶   (Goossens, Mittelbach, & Samarin 1994)
\citet{goos94}             ⟶   Goossens et al. (1994)
\citep{goos94}             ⟶   (Goossens et al. 1994)
\citep[see][]{knu86}       ⟶   (see Knuth 1986)
\citep[p.\ 427]{knu86}     ⟶   (Knuth 1986, p. 427)
\citep[see][p.\ 427]{knu86} ⟶  (see Knuth 1986, p. 427)
```

(Note carefully the syntax for getting pre- and post-notes.) Another extremely useful facility provided by `natbib` is the possibility of multiple citations:

```
\citet{j1998,j1999}        ⟶   Jones & Bland-Hawthorn (1998, 1999)
\citep{j1998,j1999}        ⟶   (Jones & Bland-Hawthorn 1998, 1999)
\citet{bh1998a,bh1998b}    ⟶   Bland-Hawthorn & Jones (1998a,b)
\citep{bh1998a,bh1998b}    ⟶   (Bland-Hawthorn & Jones 1998a,b)
```

You may occasionally need to mention author names without giving the dates (to avoid needlessly cluttering up the text with parentheses, for example), or to cite the date by itelf, so you may find the following commands useful:

```
\citeauthor{goos94}        ⟶   Goossens et al.
\citeauthor*{goos94}       ⟶   Goossens, Mittelbach, & Samarin
\citeyear{goos94}          ⟶   1994
\citeyearpar{goos94}       ⟶   (1994)
```

---

[4]The volume editors should make it clear to authors which system is preferred for the volume.

If you need to resort to "non-citations", such as "in preparation" or "private communication", you might find useful

$$\texttt{\textbackslash citetext\{in preparation\}} \quad \longrightarrow \quad \text{(in preparation)}$$

Note that such citations as these have no place in the bibliographical list since the reader has no means of acertaining their accuracy or veracity.

If the "van" in a name like van de Hulst starts a sentence it must be capitalized. `natbib` offers the following commands for achieving this in a number of contexts:

`\Citet{vhulst}`	$\longrightarrow$	Van de Hulst (1981)
`\Citep{vhulst}`	$\longrightarrow$	(Van de Hulst 1981)
`\Citeauthor{vhulst}`	$\longrightarrow$	Van de Hulst

The bibliographical database called upon by all these commands can be provided either by BIBTEX or by using the `thebibliography` environment, as in the following example:

```
\begin{thebibliography}{}
\bibitem[Bland-Hawthorn \& Jones(1998a)]{bh1998a}
Bland-Hawthorn, J., \& Jones, D. H. 1998a, PASA, 15, 44
\bibitem[Bland-Hawthorn \& Jones(1998b)]{bh1998b}
Bland-Hawthorn, J., \& Jones, D. H. 1998b, SPIE, 3355, 855
\bibitem[Goossens et al.(1994)Goossens, Mittelbach, \& Samarin]
{goos94} Goossens, M., Mittelbach, F., \& Samarin, A. 1994,
The \LaTeX\ Companion} (Reading, Mass.: Addison-Wesley)
SPIE, 3355, 855
\bibitem[Jones \& Bland-Hawthorn(1998)]{j1998}
Jones, D. H., \& Bland-Hawthorn, J. 1998, PASP, 110, 1059
\bibitem[Jones \& Bland-Hawthorn(1999)]{j1999}
Jones, D. H., \& Bland-Hawthorn 1999, in Looking Deep in the Southern
Sky, ed.\ R. Morganti \& W. J. Couch, 320
\bibitem[Knuth(1986)]{knu86}
Knuth, Donald E. 1986, The \TeX book (Reading, Mass.:
Addison-Wesley)
\bibitem[Kopka \& Daly(1999)]{kop99}
Kopka, Helmut \& Daly, Patrick W. 1999, A Guide to \LaTeX,
3rd edn (Harlow: Pearson Education)
\bibitem[Lamport(1994)]{lam94}
Lamport, Leslie 1994, \LaTeX, A Document Preparation System:
User's Guide and Reference Manual, 2nd edn (Boston: Addison-Wesley)
\bibitem[Mahoney(2002)]{ma02}
in Special Session of the XXIV General Assembly
of the IAU, Astronomy for Developing Countries, ed.\ Alan H. Batten
(San Francisco: IAU), p.\ 357
\bibitem[Oxford University Press(1983)]{hart}
Oxford University Press 1983, Hart's Rules for Compositors
and Readers at the University Press Oxford, 39th edn.\
(Oxford: Oxford University Press)
```

```
\bibitem[University of Chicago Press(1993)]{ucp93}
University of Chicago Press 1993, The Chicago Manual
of Style, 14th edn (Chicago: University of Chicago Press)
\bibitem[van de Hulst(1981)]{vhulst}
van de Hulst, H. C. 1981, Light Scattering by Small
Particles, 2nd edn (New York: Dover)
\end{thebibliography}
```

To avoid problems when your contribution is combined with others into one volume, please make sure your \bibitem entries are complete and correct by following these guidelines:

- Do not use a "mixed coding" referencing system by using thebibliography environment but not the \citet or \citep counterparts.

- Make sure all bibitem entries are complete with information in both the square brackets and the curly braces.

- Use customized short form references in the curly braces to avoid conflict with the same reference in another paper (e.g., include your last name or initials, such as {Mahoney_vhulst} or {TJM_vhulst}, rather than simply {vhulst}.

- Make certain that the year is enclosed in parentheses within the square brackets (e.g., [Lamport (1994)].

B$_{\rm IB}$T$_{\rm E}$X   Keying in a large bibliography is tedious and time-consuming. The BIBT$_{\rm E}$X program enables you to build a bibliographical source list for all your articles (provided they are produced in L$^{\rm A}$T$_{\rm E}$X). Including a useful description of BIBT$_{\rm E}$X here would make this manual too unwieldy. We hope to have a BIBT$_{\rm E}$X manual available soon, but in the meantime, other sources may provide further information.

4.4.   Abbreviations for Journals

Appendix D lists macros for many of the oft-referenced journals so that authors may use the L$^{\rm A}$T$_{\rm E}$X names rather than having to look up a particular journal's specific abbreviation. Any stylistic requirements of the editors are taken care of by the macros, so authors need not be concerned about such editorial preferences.

5.   Compiling the Files and Checking for Errors

Once everything is included in the template for the article, you are ready to compile the L$^{\rm A}$T$_{\rm E}$X file and check it for errors. L$^{\rm A}$T$_{\rm E}$X files are compiled in various ways, depending on the operating system and the software that is used.

Compiling on a Linux/Unix system is quite straightforward. At a shell prompt, simply navigate to the directory which contains the .tex file (presumably asptemplate.tex) and type the following commands in sequence to compile the L$^{\rm A}$T$_{\rm E}$X file, create a postscript file, and then create a .pdf file:

1. `latex asptemplate.tex` (run 3 times)

2. `dvips -Ppdf asptemplate.dvi` (the -P uses the correct Type 1 fonts)

3. `ps2pdf14 asptemplate.ps`

Compiling on a Windows PC can be done in various ways, depending on the software used. A few examples may help you to find the resources for compiling with your individual software. MiKTEX is the most common TEX implementation for Windows operating systems. Various editors may be used with MiKTEX such as WordPad, WinEdt or others. WinEdt includes built-in tools for compilation (under the Accessories pull-down). With the `.tex` file open in WinEdt, simply run LATEX three times, then run DVIPS and finally ps2pdf.

If using MiKTEX without an editor that includes compiling tools, files may be compiled using a command prompt (go to Start, Run, type `cmd`). After finding and noting the path to the `latex.exe` file, navigate to the directory that contains the `asptemplate.tex` file. At the command prompt from that directory, type:

1. `<path to latex.exe>\latex.exe asptemplate.tex` (run 3 times)

2. `<path to latex.exe>\dvips -Ppdf asptemplate.dvi`

3. `<path to latex.exe>\ps2pdf14 asptemplate.ps`

Once the article is compiled into a PDF, check for any errors, including the items in the checklist provided in Section 6 below. Also preflight the article for possible printer errors at `http://dx.sheridan.com/onl`. Instructions for the preflight process and a downloadable author's checklist are also available online at `http://www.aspbooks.org/author_information/`.

6. A Final Checklist before Submitting Your Article

On completion, *all* source files for your article must be sent to the volume editors, who will then copy-edit your paper for consistency of style. Make certain to send the `.tex` template, all image files, and a `.dvi`, `.ps`, or `.pdf` file for their reference. Before submitting the article, check for each of the following items:

- Article is within page limitations set by editor.

- Paper compiles properly without errors.

- No fundamental modifications to the basic template are present, including special definitions, special macros, packages, `\vspace` commands, font adjustments, etc. (§3.3, p. 10)

- Commented-out text has been removed. (§3.3, pp. 10,11)

- Author and shortened title running heads are proper for the paper and shortened so page number is within margin. (§3.1, p. 4)

- Paper checked for general questions of format and style, including, but not limited to, the following:

  1. capitalization, layout and length of running heads (§3.1, p. 4), titles (§3.2, p. 5)and sections/subsections (§3.3, p. 8);

  2. page numbers within margin (§3.1, p. 4);

  3. author names spelled correctly and full postal addresses given (§3.2, pp. 5-6);

  4. abstracts (§3.2, p. 7);

  5. all margins—left, right, top and bottom (§3.1, p. 4; §3.2, p. 5; §3.3, p. 9; §3.6, p. 21);

  6. standard font size and no Type 3 fonts (§3.3, pp. 10-11; §3.6, p. 23; §4.2, p. 25);

  7. spacing (§3.3, pp. 9-10);

  8. section headings (§3.3; p. 8).

- All tables are correctly positioned within margins, are properly formatted, are referred to in the text. (§3.5, pp. 16-20)

- All figures are correctly positioned within margins, are minimum 300 dpi resolution, and are referred to in the text. All labeling or text will be legible with 10% reduction. Questionable images printed, checked and replaced if necessary. Figures do not cover text or running heads, and proper permissions have been granted and acknowledged. (§3.6, pp. 21-24)

- All acknowledgments (pp. 11-12, p. 20) and discussions are in proper format.

- All references quoted in the text are listed in the bibliography; all items in the bibliography have been referred to in the text. (§4, pp. 24-28)

- All bibliography entries are in the proper format, using one of the referencing styles given. Each of the references is bibliographically complete, including full names of authors, editors, publishers, place of publication, page numbers, years, etc. (§§4.2-4.3, pp. 25-28)

- References to preprints replaced with publication information when possible.

If the article does not conform to each item in the checklist, then your article is still in the preliminary draft stage and is not yet ready to be sent to the editors. It is only simple courtesy to get everything right before you submit your article.

7.   Persons to Contact

For information relating to page limits, deadlines, etc., contact the volume editor(s) at the email address provided by the conference organizers.

All queries relating to the LATEX style file, author's/editor's instruction manual, etc., should be directed to Terry Mahoney (`tjm@iac.es` with a copy of the email sent to `aspcstech@byu.edu`).

8. Your Feedback

This manual has been written with the sole aim of helping you to typeset your article with the minimum of trouble. If you have any suggestions for its improvement, we would very much like to hear them. Please send any suggestions (or complaints!) to `tjm@iac.es`, `aspcstech@byu.edu` and `aspcs@byu.edu`.

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Appendix A: Some Useful LaTeX Symbols and Diacritic Signs[5]

`\'{o}`	$\longrightarrow$	ò
`\'{o}`	$\longrightarrow$	ó
`\^{o}`	$\longrightarrow$	ô
`\"{o}`	$\longrightarrow$	ö
`\~{o}`	$\longrightarrow$	õ
`\={o}`	$\longrightarrow$	ō
`\.{o}`	$\longrightarrow$	ȯ
`\u{o}`	$\longrightarrow$	ŏ
`\v{o}`	$\longrightarrow$	ǒ
`\H{o}`	$\longrightarrow$	ő
`\t{oo}`	$\longrightarrow$	o͡o
`\c{o}`	$\longrightarrow$	o̦
`\d{o}`	$\longrightarrow$	ọ
`\b{o}`	$\longrightarrow$	o̠
`\oe`	$\longrightarrow$	œ
`\OE`	$\longrightarrow$	Œ
`\ae`	$\longrightarrow$	æ
`\AE`	$\longrightarrow$	Æ
`\aa`	$\longrightarrow$	å
`\AA`	$\longrightarrow$	Å
`\o`	$\longrightarrow$	ø
`\O`	$\longrightarrow$	Ø
`\l`	$\longrightarrow$	ł
`\L`	$\longrightarrow$	Ł
`\ss`	$\longrightarrow$	ß
`?'`	$\longrightarrow$	¿
`!'`	$\longrightarrow$	¡
`\dag`	$\longrightarrow$	†
`\ddag`	$\longrightarrow$	‡
`\S`	$\longrightarrow$	§
`\S\S`	$\longrightarrow$	§§
`\P`	$\longrightarrow$	¶
`\copyright`	$\longrightarrow$	©
`\pounds`	$\longrightarrow$	£
`\#`	$\longrightarrow$	#
`\$`	$\longrightarrow$	$
`\%`	$\longrightarrow$	%
`\&`	$\longrightarrow$	&
`\_`	$\longrightarrow$	_
`\{`	$\longrightarrow$	{
`\}`	$\longrightarrow$	}

---

[5]The vowel-ligatures *æ* and *œ* should normally be avoided. The use of *æ* should be restricted to Old English words and *œ* should be used for French words; hence, *Ælfric*, but *Aeneas* and *Aeschylus*, and *œuvre*, but *Oedipus*. The *Æ* in Ælfric is a single letter (*ash* in Old English), whereas the *Ae* in *Aeschylus* is a digraph, so we would write *β Lacertae* and not *β Lacertæ* (see Oxford University Press 1983).

Appendix B: Standard LATEX 2$_\varepsilon$ Mathematics Commands

Greek Letters

`$\alpha$`	$\longrightarrow$	α
`$\beta$`	$\longrightarrow$	β
`$\gamma$`	$\longrightarrow$	γ
`$\Gamma$`	$\longrightarrow$	Γ
`$\delta$`	$\longrightarrow$	δ
`$\Delta$`	$\longrightarrow$	Δ
`$\epsilon$`	$\longrightarrow$	ϵ
`$\varepsilon$`	$\longrightarrow$	ε
`$\zeta$`	$\longrightarrow$	ζ
`$\eta$`	$\longrightarrow$	η
`$\theta$`	$\longrightarrow$	θ
`$\Theta$`	$\longrightarrow$	Θ
`$\vartheta$`	$\longrightarrow$	ϑ
`$\iota$`	$\longrightarrow$	ι
`$\kappa$`	$\longrightarrow$	κ
`$\lambda$`	$\longrightarrow$	λ
`$\Lambda$`	$\longrightarrow$	Λ
`$\mu$`	$\longrightarrow$	μ
`$\nu$`	$\longrightarrow$	ν
`$\xi$`	$\longrightarrow$	ξ
`$\Xi$`	$\longrightarrow$	Ξ
`$o$`	$\longrightarrow$	o
`$\pi$`	$\longrightarrow$	π
`$\Pi$`	$\longrightarrow$	Π
`$\varpi$`	$\longrightarrow$	ϖ
`$\rho$`	$\longrightarrow$	ρ
`$\varrho$`	$\longrightarrow$	ϱ
`$\sigma$`	$\longrightarrow$	σ
`$\Sigma$`	$\longrightarrow$	Σ
`$\varsigma$`	$\longrightarrow$	ς
`$\tau$`	$\longrightarrow$	τ
`$\upsilon$`	$\longrightarrow$	Υ
`$\phi$`	$\longrightarrow$	ϕ
`$\Phi$`	$\longrightarrow$	Φ
`$\varphi$`	$\longrightarrow$	φ
`$\chi$`	$\longrightarrow$	χ
`$\psi$`	$\longrightarrow$	ψ
`$\Psi$`	$\longrightarrow$	Ψ
`$\omega$`	$\longrightarrow$	ω
`$\Omega$`	$\longrightarrow$	Ω

Calligraphic Letters

`$\mathcal{F}$`	$\longrightarrow$	$\mathcal{F}$

(uppercase letters only)

Mathematical Symbols

`$\pm$`	$\longrightarrow$	$\pm$
`$\mp$`	$\longrightarrow$	$\mp$
`$\times$`	$\longrightarrow$	$\times$
`$\div$`	$\longrightarrow$	$\div$
`$\ast$`	$\longrightarrow$	$\ast$
`$\star$`	$\longrightarrow$	$\star$
`$\circ$`	$\longrightarrow$	$\circ$
`$\bullet$`	$\longrightarrow$	$\bullet$
`$\cdot$`	$\longrightarrow$	$\cdot$
`$\cap$`	$\longrightarrow$	$\cap$
`$\cup$`	$\longrightarrow$	$\cup$
`$\uplus$`	$\longrightarrow$	$\uplus$
`$\sqcap$`	$\longrightarrow$	$\sqcap$
`$\vee$`	$\longrightarrow$	$\vee$
`$\wedge$`	$\longrightarrow$	$\wedge$
`$\setminus$`	$\longrightarrow$	$\setminus$
`$\wr$`	$\longrightarrow$	$\wr$
`$\diamond$`	$\longrightarrow$	$\diamond$
`$\bigtriangleup$`	$\longrightarrow$	$\bigtriangleup$
`$\bigtriangledown$`	$\longrightarrow$	$\bigtriangledown$
`$\triangleleft$`	$\longrightarrow$	$\triangleleft$
`$\triangleright$`	$\longrightarrow$	$\triangleright$
`$\oplus$`	$\longrightarrow$	$\oplus$
`$\$ominus`	$\longrightarrow$	$\ominus$
`$\otimes$`	$\longrightarrow$	$\otimes$
`$\oslash$`	$\longrightarrow$	$\oslash$
`$\odot$`	$\longrightarrow$	$\odot$
`$\bigcirc$`	$\longrightarrow$	$\bigcirc$
`$\dagger$`	$\longrightarrow$	$\dagger$
`$\ddagger$`	$\longrightarrow$	$\ddagger$
`$\amalg$`	$\longrightarrow$	$\amalg$
`$\leq$`	$\longrightarrow$	$\leq$
`$\prec$`	$\longrightarrow$	$\prec$
`$\preceq$`	$\longrightarrow$	$\preceq$
`$\ll$`	$\longrightarrow$	$\ll$
`$\subset$`	$\longrightarrow$	$\subset$
`$\subseteq$`	$\longrightarrow$	$\subseteq$
`$\sqsubseteq$`	$\longrightarrow$	$\sqsubseteq$
`$\in$`	$\longrightarrow$	$\in$
`$\vdash$`	$\longrightarrow$	$\vdash$
`$\geq$`	$\longrightarrow$	$\geq$
`$\succ$`	$\longrightarrow$	$\succ$
`$\succeq$`	$\longrightarrow$	$\succeq$
`$\gg$`	$\longrightarrow$	$\gg$
`$\supset$`	$\longrightarrow$	$\supset$
`$\supseteq$`	$\longrightarrow$	$\supseteq$
`$\sqsupseteq$`	$\longrightarrow$	$\sqsupseteq$
`$\ni$`	$\longrightarrow$	$\ni$
`$\dashv$`	$\longrightarrow$	$\dashv$
`$\equiv$`	$\longrightarrow$	$\equiv$

`$\sim$`	$\longrightarrow$	$\sim$
`$\simeq$`	$\longrightarrow$	$\simeq$
`$\asymp$`	$\longrightarrow$	$\asymp$
`$\approx$`	$\longrightarrow$	$\approx$
`$\cong$`	$\longrightarrow$	$\cong$
`$\neq$`	$\longrightarrow$	$\neq$
`$\doteq$`	$\longrightarrow$	$\doteq$
`$\notin$`	$\longrightarrow$	$\notin$
`$\models$`	$\longrightarrow$	$\models$
`$\perp$`	$\longrightarrow$	$\perp$
`$\mid$`	$\longrightarrow$	$\mid$
`$\parallel$`	$\longrightarrow$	$\parallel$
`$\bowtie$`	$\longrightarrow$	$\bowtie$
`$\smile$`	$\longrightarrow$	$\smile$
`$\frown$`	$\longrightarrow$	$\frown$
`$\propto$`	$\longrightarrow$	$\propto$
`$\leftarrow$`	$\longrightarrow$	$\leftarrow$
`$\Leftarrow$`	$\longrightarrow$	$\Leftarrow$
`$\rightarrow$`	$\longrightarrow$	$\rightarrow$
`$\Rightarrow$`	$\longrightarrow$	$\Rightarrow$
`$\leftrightarrow$`	$\longrightarrow$	$\leftrightarrow$
`$\Leftrightarrow$`	$\longrightarrow$	$\Leftrightarrow$
`$\mapsto$`	$\longrightarrow$	$\mapsto$
`$\hookleftarrow$`	$\longrightarrow$	$\hookleftarrow$
`$\leftharpoonup$`	$\longrightarrow$	$\leftharpoonup$
`$\lefharpoondown$`	$\longrightarrow$	$\leftharpoondown$
`$\rightleftharpoons$`	$\longrightarrow$	$\rightleftharpoons$
`$\longleftarrow$`	$\longrightarrow$	$\longleftarrow$
`$\Longleftarrow$`	$\longrightarrow$	$\Longleftarrow$
`$\longrightarrow$`	$\longrightarrow$	$\longrightarrow$
`$\Longrightarrow$`	$\longrightarrow$	$\Longrightarrow$
`$\longleftrightarrow$`	$\longrightarrow$	$\longleftrightarrow$
`$\Longleftrightarrow$`	$\longrightarrow$	$\Longleftrightarrow$
`$\longmapsto$`	$\longrightarrow$	$\longmapsto$
`$\hookrightarrow$`	$\longrightarrow$	$\hookrightarrow$
`$\rightharpoonup$`	$\longrightarrow$	$\rightharpoonup$
`$\rightharpoondown$`	$\longrightarrow$	$\rightharpoondown$
`$\uparrow$`	$\longrightarrow$	$\uparrow$
`$\Uparrow$`	$\longrightarrow$	$\Uparrow$
`$\downarrow$`	$\longrightarrow$	$\downarrow$
`$\Downarrow$`	$\longrightarrow$	$\Downarrow$
`$\updownarrow$`	$\longrightarrow$	$\updownarrow$
`$\Updownarrow$`	$\longrightarrow$	$\Updownarrow$
`$\nearrow$`	$\longrightarrow$	$\nearrow$
`$\searrow$`	$\longrightarrow$	$\searrow$
`$\swarrow$`	$\longrightarrow$	$\swarrow$
`$\nwarrow$`	$\longrightarrow$	$\nwarrow$
`$\aleph$`	$\longrightarrow$	$\aleph$
`$\hbar$`	$\longrightarrow$	$\hbar$
`$\imath$`	$\longrightarrow$	$\imath$

$\jmath$	$\longrightarrow$	$\jmath$
ℓ	$\longrightarrow$	ℓ
$\wp$	$\longrightarrow$	$\wp$
$\Re$	$\longrightarrow$	$\Re$
$\Im$	$\longrightarrow$	$\Im$
$\prime$	$\longrightarrow$	$\prime$
$\emptyset$	$\longrightarrow$	$\emptyset$
∇	$\longrightarrow$	∇
$\surd$	$\longrightarrow$	$\surd$
$\top$	$\longrightarrow$	$\top$
$\bot$	$\longrightarrow$	$\bot$
$\|$	$\longrightarrow$	$\|$
$\angle$	$\longrightarrow$	$\angle$
$\forall$	$\longrightarrow$	$\forall$
$\exists$	$\longrightarrow$	$\exists$
$\neg$	$\longrightarrow$	$\neg$
$\flat$	$\longrightarrow$	$\flat$
$\natural$	$\longrightarrow$	$\natural$
$\sharp$	$\longrightarrow$	$\sharp$
$\backslash$	$\longrightarrow$	$\backslash$
∂	$\longrightarrow$	∂
∞	$\longrightarrow$	∞
$\triangle$	$\longrightarrow$	$\triangle$
$\clubsuit$	$\longrightarrow$	$\clubsuit$
$\diamondsuit$	$\longrightarrow$	$\diamondsuit$
$\heartsuit$	$\longrightarrow$	$\heartsuit$
$\spadesuit$	$\longrightarrow$	$\spadesuit$
$\sum$	$\longrightarrow$	$\sum$
$\prod$	$\longrightarrow$	$\prod$
$\coprod$	$\longrightarrow$	$\coprod$
$\int$	$\longrightarrow$	$\int$
$\oint$	$\longrightarrow$	$\oint$
$\bigcap$	$\longrightarrow$	$\bigcap$
$\bigcup$	$\longrightarrow$	$\bigcup$
$\bigsqcup$	$\longrightarrow$	$\bigsqcup$
$\bigvee$	$\longrightarrow$	$\bigvee$
$\bigwedge$	$\longrightarrow$	$\bigwedge$
$\bigodot$	$\longrightarrow$	$\bigodot$
$\bigotimes$	$\longrightarrow$	$\bigotimes$
$\bigoplus$	$\longrightarrow$	$\bigoplus$
$\biguplus$	$\longrightarrow$	$\biguplus$
$\arccos$	$\longrightarrow$	$\arccos$
$\arcsin$	$\longrightarrow$	$\arcsin$
$\arctan$	$\longrightarrow$	$\arctan$
$\cos$	$\longrightarrow$	$\cos$
$\cosh$	$\longrightarrow$	$\cosh$
$\cot$	$\longrightarrow$	$\cot$
$\coth$	$\longrightarrow$	$\coth$
$\csc$	$\longrightarrow$	$\csc$
$\deg$	$\longrightarrow$	$\circ$
$\det$	$\longrightarrow$	$\det$

`$\dim$`	$\longrightarrow$	dim
`$\exp$`	$\longrightarrow$	exp
`$\gcd$`	$\longrightarrow$	gcd
`$\hom$`	$\longrightarrow$	hom
`$\inf$`	$\longrightarrow$	inf
`$\ker$`	$\longrightarrow$	ker
`$\lg$`	$\longrightarrow$	lg
`$\lim$`	$\longrightarrow$	lim
`$\liminf$`	$\longrightarrow$	lim inf
`$\limsup$`	$\longrightarrow$	lim sup
`$\ln$`	$\longrightarrow$	ln
`$\log$`	$\longrightarrow$	log
`$\max$`	$\longrightarrow$	max
`$\min$`	$\longrightarrow$	min
`$\Pr$`	$\longrightarrow$	Pr
`$\sec$`	$\longrightarrow$	sec
`$\sin$`	$\longrightarrow$	sin
`$\sinh$`	$\longrightarrow$	sinh
`$\sup$`	$\longrightarrow$	sup
`$\tan$`	$\longrightarrow$	tan
`$\tanh$`	$\longrightarrow$	tanh
`$\cdots$`	$\longrightarrow$	$\cdots$
`$\vdots$`	$\longrightarrow$	$\vdots$
`$\ddots$`	$\longrightarrow$	$\ddots$
`$($`	$\longrightarrow$	(
`$[$`	$\longrightarrow$	[
`$\{$`	$\longrightarrow$	{
`$\lfloor$`	$\longrightarrow$	$\lfloor$
`$\lciel$`	$\longrightarrow$	$\lceil$
`$\langle$`	$\longrightarrow$	$\langle$
`$/$`	$\longrightarrow$	/
`$|$`	$\longrightarrow$	$|$
`$)$`	$\longrightarrow$	)
`$]$`	$\longrightarrow$	]
`$\}$`	$\longrightarrow$	}
`$\rfloor$`	$\longrightarrow$	$\rfloor$
`$\rceil$`	$\longrightarrow$	$\rceil$
`$\rangle$`	$\longrightarrow$	$\rangle$
`$\backslash$`	$\longrightarrow$	\
`$\|$`	$\longrightarrow$	$\|$
`$\uparrow$`	$\longrightarrow$	$\uparrow$
`$\downarrow$`	$\longrightarrow$	$\downarrow$
`$\updownarrow$`	$\longrightarrow$	$\updownarrow$
`$\Uparrow$`	$\longrightarrow$	$\Uparrow$
`$\Downarrow$`	$\longrightarrow$	$\Downarrow$
`$\Updownarrow$`	$\longrightarrow$	$\Updownarrow$

Examples of Math Commands Taking Arguments

\frac{}{}:

$$\frac{dz}{dx}=
-\frac{\frac{\partial(F,G)}{\partial(y,
x)}}{\frac{\partial(F,G)}{\partial(y,z)}}$$

$$\frac{dz}{dx} = -\frac{\frac{\partial(F,G)}{\partial(y,x)}}{\frac{\partial(F,G)}{\partial(y,z)}}$$

In fact, such "double-decker" fractions are not a good idea typographically; the
preceding expression would be better represented as

$$\frac{dz}{dx}=
-\frac{\partial(F,G)}{\partial(y,x)}\Bigg/
\frac{\partial(F,G)}{\partial(y,z)}$$

$$\frac{dz}{dx} = -\frac{\partial(F,G)}{\partial(y,x)} \Bigg/ \frac{\partial(F,G)}{\partial(y,z)}$$

\underbrace{} *and* \overbrace{}:

$$\overbrace{a + \underbrace{b + c + d} + e}$$

$$\overbrace{a + \underbrace{b + c + d} + e}$$

$$\underbrace{a +
\overbrace{b + c + d}^{123} + e}_{\alpha\beta\gamma} $$

$$\underbrace{a + \overbrace{b + c + d}^{123} + e}_{\alpha\beta\gamma}$$

$$\int \underbrace{x^2}_{u}\underbrace{e^{5x}dx}_{dv}
= \underbrace{\frac{e^{5x}}{5}}_{uv}-
\int \underbrace{\frac{2}{5}xe^{5x}}_{vdu}$$

$$\int \underbrace{x^2}_{u}\underbrace{e^{5x}dx}_{dv} = \underbrace{\frac{e^{5x}}{5}}_{uv} - \int \underbrace{\frac{2}{5}xe^{5x}}_{vdu}$$

\overline{}:

$$(\Delta n_i)^2 = \overline{n_i^2} - \overline{n}_i^2
= kT\left(\frac{\partial\overline{n}_i}{\partial \mu}
\right)_{T,V}$$

$$(\Delta n_i)^2 = \overline{n_i^2} - \overline{n}_i^2 = kT \left(\frac{\partial \overline{n}_i}{\partial \mu} \right)_{T,V}$$

\sqrt[]{}

\sqrt[4]{\frac{2}{x}}

$$\sqrt[4]{\frac{2}{x}}$$

\frac{2}{3\sqrt[3]{x}}

$$\frac{2}{3\sqrt[3]{x}}$$

$$\sin\vartheta =\sqrt{
\left|\begin{array}{cc}
\lambda^1 & \lambda^2\\
\mu^2 & \mu^2
\end{array}\right| \times
\left| \begin{array}{cc}
\lambda_1 & \lambda_2\\
\mu_1 & \mu_2
\end{array}
\right|
} $$

$$\sin \vartheta = \sqrt{ \left| \begin{array}{cc} \lambda^1 & \lambda^2 \\ \mu^2 & \mu^2 \end{array} \right| \times \left| \begin{array}{cc} \lambda_1 & \lambda_2 \\ \mu_1 & \mu_2 \end{array} \right| }$$

Appendix C: Some Useful Mathmode Macros

The following macros produce various troublesome or laborious mathematical and astronomical symbols.

$$
\begin{array}{rcl}
\verb|\deg| & \longrightarrow & {}^{\circ} \\
\verb|\arcmin| & \longrightarrow & {}' \\
\verb|\arcsec| & \longrightarrow & {}'' \\
\verb|\fp| & \longrightarrow & \overset{\text{p}}{.} \\
\verb|\fd| & \longrightarrow & \overset{\text{d}}{.} \\
\verb|\fh| & \longrightarrow & \overset{\text{h}}{.} \\
\verb|\fm| & \longrightarrow & \overset{\text{m}}{.} \\
\verb|\fs| & \longrightarrow & \overset{\text{s}}{.} \\
\verb|\fdg| & \longrightarrow & \overset{\circ}{.} \\
\verb|\farcm| & \longrightarrow & \overset{\prime}{.} \\
\verb|\farcs| & \longrightarrow & \overset{\prime\prime}{.} \\
\verb|\sun| & \longrightarrow & \odot \\
\verb|\earth| & \longrightarrow & \oplus \\
\verb|\micron| & \longrightarrow & \mu\text{m} \\
\verb|\la| & \longrightarrow & \lesssim \\
\verb|\ga| & \longrightarrow & \gtrsim \\
\verb|\onehalf| & \longrightarrow & {}^{1}\!/_{2} \\
\verb|\onethird| & \longrightarrow & {}^{1}\!/_{3} \\
\verb|\twothirds| & \longrightarrow & {}^{2}\!/_{3} \\
\verb|\onequarter| & \longrightarrow & {}^{1}\!/_{4} \\
\verb|\threequarters| & \longrightarrow & {}^{3}\!/_{4} \\
\verb|\ubv| & \longrightarrow & UBV \\
\verb|\ubvr| & \longrightarrow & UBVR \\
\verb|\ubvri| & \longrightarrow & UBVRI \\
\verb|\ubvrij| & \longrightarrow & UBVRIJ \\
\verb|\ubvrijh| & \longrightarrow & UBVRIJH \\
\verb|\ubvrijhk| & \longrightarrow & UBVRIJHK \\
\verb|\ub| & \longrightarrow & U-B \\
\verb|\bv| & \longrightarrow & B-V \\
\verb|\vr| & \longrightarrow & V-R \\
\verb|\ur| & \longrightarrow & U-R \\
\end{array}
$$

Appendix D: Journal Abbreviations

\aj	Astronomical Journal (AJ)
\araa	Annual Review of Astronomy and Astrophysics(ARA&A)
\apj	Astrophysical Journal (ApJ)
\apjs	——, Supplement Series (ApJS)
\ao	Applied Optics (Appl.Optics)
\apss	Astrophysics and Space Science(Ap&SS)
\aap	Astronomy and Astrophysics (A&A)
\aaps	——, Supplement Series (A&AS)
\azh	Astronomicheskii Zhurnal (AZh)
\baas	Bulletin of the AAS (BAAS)
\jrasc	Journal of the RAS of Canada (JRASC)
\memras	Memoirs of the RAS (MmRAS)
\mnras	Monthly Notices of the RAS (MNRAS)
\nat	Nature (Nat)
\pra	Physical Review A: General Physics (Phys.Rev.A)
\prb	Physical Review B: Solid State (Phys.Rev.B)
\prc	Physical Review C (Phys.Rev.C)
\prd	Physical Review D (Phys.Rev.D)
\prl	Physical Review Letters (Phys.Rev.Lett)
\pasp	Publications of the ASP (PASP)
\pasj	Publications of the ASJ (PASJ)
\qjras	Quarterly Journal of the RAS (QJRAS)
\science	Science (Sci)
\skytel	Sky and Telescope (S&T)
\sovast	Soviet Astronomy (Soviet Ast.)
\ssr	Space Science Reviews (Space Sci.Rev.)
\zap	Zeitschrift für Astrophysik (ZAp)