Astronomy & Astrophysics Document Class V4.01

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1 Getting started

As the articles for the A&A will be available online in different formats – one of these is full-text-searchable hyper-text – we strongly suggest you strictly obey the LaTeX conventions. This will ease the processing of your article and avoids any problems with formats other than PostScript.

Please always give a `\label` where possible and use `\ref` for cross-referencing. Such cross-references will be converted to hyper-links in HTML. The `\cite`- and `\bibitem`-mechanism for bibliographic references or the use of BibTeX (see Sect. 4.1) as well as the `\object` command (see Sect. 5.5) is also obligatory.

Please refrain from using any self-made definitions since these will get lost during further conversion of your text. If you use typing abbreviations, "search and replace" them before submitting your article to the publisher.

1.1 TeXnical background information

This document class was derived from the LaTeX 2_ε `article.cls` based on TeX version 3.141 and LaTeX 2_ε. Hence formulas and text are typed using the standard LaTeX 2_ε commands. The standard sectioning commands are also kept. Using `aa.cls` with other versions or implementations may cause difficulties. If this is the case, please contact us and we will try to help you.

2 The document structure

2.1 Loading the class

To load the document class, you have to include

```
\documentclass{aa}
```

at the beginning of your article. This replaces the former `\documentstyle` command. There is a class option `referee`, which you should set to produce the two hardcopies for the referees with a special layout (it also provides for a list of astronomical objects – see Sect. 5.5 below):

```
\documentclass[referee]{aa}
```

2.2 Using PostScript fonts

The journal to which you are planning to submit your paper is phototypeset using the PostScript[1] (PS) Times fonts. As the use of PostScript fonts results in a slightly different page make-up from Computer Modern (CM) fonts, we encourage you to use our document class together with the `psnfss` package `times`. This will show you the page make-up parallel-to-print. Ask your local TeXpert for details. PostScript previewing is possible on most systems. On some installations, however, on-screen previewing may be possible only with CM fonts.

[1] PostScript is a trademark of Adobe.

To use PS fonts, the following CM fonts have to be replaced:

CM font	corresponding PS font
cmr	Times roman
cmbx	Times bold
cmti	Times italic
cmtt	Courier
cmbxti	Times bold italic
cmss	Helvetica

If, for technical reasons, you are not able to use the PS fonts, it is also possible to use our document class together with the ordinary CM fonts. Note, however, that in this case line and page breaks will change when we reTEX your file with PS fonts, making it necessary for you to check them again once you receive the proofs from the printer. The additional time required for these procedures plus the additional costs involved mean that (preferably) files TEXed with PS fonts should be submitted.

2.3 Section numbers and thesaurus codes

When your article is published, the title and author(s) will be printed in the table of contents under the appropriate section heading (e.g. "Cosmology", "Extragalactic astronomy", etc.). In the annual index your article will appear under between one and six (maximum) different subject headings (or key words). For computer storage and sorting, it is necessary that the *section number* and *thesaurus code numbers* are typeset above the title in the page proofs. This is done with the command

```
\thesaurus{<section number>(<thesaurus code>; ... <thesaurus code>)}
```

The list of possible thesaurus codes and their corresponding keywords is included in the file `aa.the` together with the list of the twelve sections. The code numbers correspond to the subject headings (or key words) used in the annual indexes.

Example: An article on "Formation of primordial molecules" belongs to Sect. 2 ("Cosmology") and will be listed in the annual index under the key words "Molecular processes" (02.13.5) and "Cosmology: theory" (12.03.4). The complete coding, printed automatically in boldface at the top of the first page, should be as follows (note that the codes within the parentheses are separated by semicolons):

```
\thesaurus{02(02.13.5; 12.03.4)}
```

2.4 The title

Code the title of your article as follows:

```
\title{<your title>}
\subtitle{<your subtitle>}
```

The main title and the subtitle should not be capitalized, except for the first letter and any other words that are always capitalized. Maths variables and symbols should be typeset as in the text.

If a long `\title` or `\subtitle` needs to split accross two or more lines, please insert linebreaks (\\).

2.5 Names of authors

The preferred form for each name is: initial(s) of the forename(s) followed by the family name.

```
\author{<first author's name>
  \and <second author's name> ...}
```

If there is more than one author, the order is optional. The names should be separated by `\and`.

If the authors have different affiliations, each name has to be followed by

```
\inst{<number>}
```

Numbers referring to different addresses should be attached to each author, pointing to the corresponding institute.

2.6 Addresses

If there is more than one address, the entries are numbered automatically with `\and`, in the order in which you type them. Please make sure that the numbers match those placed next to the authors' names.

```
\institute{<name of the first institute>
\and <name of the second institute> ...}
```

2.7 Footnotes to the title block

If footnotes to the title, subtitle, author's names or institute addresses are needed, please code them with

```
\thanks{<text of footnote>}
```

immediately after the word where the footnote indicator should be placed. These footnotes are marked by asterisks ($*$). If you need more than one consecutive footnote, use `\fnmsep` to typeset the comma separating the asterisks (see demo file).

If there is more than one author, please provide an address for offprint requests:

```
\offprints{<name>}
\mail{<corresponding author>}
```

Stating the present address of an author is done with

```
\thanks{\emph{Present address:}<address>}
```

2.8 Dates of receipt and acceptance

Although the dates of receipt and acceptance of your manuscript will be fixed by the editors and inserted by the publisher, please type:

```
\date{Received <date> / Accepted <date>}
```

The date is inserted later in the format `day month year`. An example will be given in Sect. 2.12 on page 6.

2.9 Typesetting the header

Having entered the commands described in this section, please format the complete heading of your article by typing:

```
\maketitle
```

If you leave it out, the work done so far will produce *no* text. You will find a complete example of the beginning of an article in Sect. 2.12.

2.10 Changing the running head

The command `\maketitle` will automatically generate the running title, deriving it from the author and title inputs. If the title is too long for the space available, LaTeX will ask you to supply a shorter version. In this case enter

```
\titlerunning{<short title>}
\authorrunning{<name(s) of author(s)>}
```

before `\maketitle`. If there are two authors, both names, separated by an ampersand (`&`, coded as `\&`), should be given; if there are more than two authors, the name of the first plus "et al." should be given. The title should be shortened to a maximum of about 60 characters, spaces ignored, following the wording of the original title as closely as possible. If a paper has a numbered subtitle, the main title (length permitting) should be given, followed by the roman numeral of the subtitle. The Editors reserve the right to modify the running head suggested by the authors, should this be necessary.

The following illustrates the required style (the colon will be inserted by the macro):

N. Copernicus: How active is NGC 4258?
E. Hertzsprung & E.P. Hubble: Optical spectroscopy of WR stars in M33 and M31. II
A.S. Eddington et al.: Infrared lines as probes of solar magnetic features. IV
C. Barbieri et al.: (RN) First HST/FOC images of the low mass companion of the astronomic binary Gliese 623

2.11 Abstract and keywords

Proceed as follows:

```
\begin{abstract}
<text of your abstract (summary)>
\keywords{<keyword -- keyword -- keyword ...>}
\end{abstract}
```

For the sake of simplicity and uniformity, authors should choose not more than six key words which are identical to those already chosen as the thesaurus codes (see Sect. 2.3). The heading "Key words" appears automatically. The individual key words should be separated by an en-dash (--) with one blank before and after.

2.12 An example of the beginning of an article

```
\documentclass{aa}

\begin{document}

\thesaurus{08(09.10.1; 09.13.2; 08.16.5)}

\title{Optimality relationships for $p$-cyclic SOR
  \thanks{Research supported in part by the US Air Force
    under grant no.\ AFOSR-88-0285 and
    the National Science Foundation under grant
    no.\ DMS-85-21154}\fnmsep
  \thanks{This is a second footnote}\\
  resulting in asymptotically faster convergence\\
  for the same amount of work per iteration}

\subtitle{II. An example text with infinitesimal
  scientific value\\
  whose title and subtitle may also be split}

\author{Daniel J.\,Pierce\inst{1},
  \and Apostolos Hadjidimios\inst{2}
  \thanks{\emph{Present address:}
    Department of Computer Science, Purdue University,
    West Lafayette, IN 47907, USA}
    \and Robert J.\,Plemmons\inst{3}}

\offprints{R. Plemmons}

\institute{Boeing Computer Service, P.O. Box 24346,
  MS 7L-21, Seattle, WA 98124-0346, USA
  \and Department of Mathematics, University of Ioannina,
  GR-45 1210, Ioannina, Greece
  \and Department of Computer Science and Mathematics,
  North Carolina State University, Raleigh, NC 27695-8205, USA}

\date{Received 2 November 1992 / Accepted 7 January 1993}

\maketitle

\begin{abstract}
The optimality question for block $p$-cyclic matrix
into a block $q$-cyclic form, $q < p$, results in
```

```
asymptotically faster SOR convergence for the same amount
of work per iteration. As a consequence block 2-cyclic SOR
is optimal under these conditions.
%
\keywords{interstellar medium: jets and outflows --
  interstellar medium: molecules -- stars: pre-main-sequence}
\end{abstract}
```

2.13 Acknowledgements

For acknowledgements use the environment:

```
\begin{acknowlegements}
\end{acknowledgements}
```

2.14 Appendices

If you enter the command

```
\appendix
```

the sections that follow will be numbered with capital letters.

3 Floating objects

3.1 Figures

It is desirable for graphics inclusions to conform to certain codes of behaviour, so that the graphics can be manipulated readily and reliably. For that purpose graphics should be included as a PostScript file.

When a PostScript file contains a simple one-page description for the purpose of inclusion in other documents, it is necessary that it conformes to the encapsulated PostScript file format (EPSF). One of the advantages of this format is that the application that includes the file can determine the size and location of the graphic on the page *without* having to interpret any PostScript code. It is, however, necessary to read in a portion of the data (the header of the PostScript file) to find this information.[2]

Most graphic packages and astronomical application software support the EPSF format. If yours does not, convert the file from another format; for information on available software, consult your local system administrator. Keep in mind that conversions usually reduce the quality of the graphics and may increase the document length.

The easiest way to include your `.eps` files is with the `graphics` package, which comes along with the standard LaTeX 2_ε distribution. Include the package in the preamble of your document:

```
\usepackage{graphics}
```

[2] View your `.eps` file with a text editor. It is necessary to have proper line endings in the header of the file to have the commands recognizable for TeX or `dvips`. The different end of line representations cause problems e.g. when creating the `.eps` files on a Macintosh but TeXing your manuscript on a UNIX or PC operating system.

To fill the whole column width, the figure has to be resized. Therefore, the syntax to include a one-column-spanning graphic is

```
\begin{figure}
  \resizebox{\hsize}{!}{\includegraphics{<yourfilename.eps>}}
  \caption{<Your caption text...>}
  \label{<Your label>}
\end{figure}
```

For a two-column-wide plot, substitute `figure` by `figure*`.

A&A also uses a third width, 12 cm; that is, with the figure caption at its lower right-hand side. To achieve this format, use

```
\begin{figure*}
  \resizebox{12cm}{!}{\includegraphics{<yourfilename.eps>}}
  \hfill
  \parbox[b]{55mm}{
    \caption{<Your caption text...>}
    \label{<Your label>}}
\end{figure*}
```

Note the use of the `\label` command. All cross-referencing to the figures should then be written as "`...see Fig.~\ref{<Your label>}`".

The A&A macro sets all figures and tables at the top of the columns and flush left according to layout conventions. The content and style of your figure (line art, grey-scale etc., size of text labels and other marks) mean that widths less than the ones given here would be more suitable for the page layout. Please see printed editions of the A&A for examples. We reserve the right to change the size pre-set by you if layout restrictions apply.

If you have colour images to be printed, please request additional instructions by email to `astro@springer.de`. Otherwise, digital colour images will appear as grey-scale images in the printed edition, and as colour images only in the electronic edition (bear in mind download times!).

To name your files, please use the DOS 8:3 convention to ensure platform-independent usability. You may preferably include the manuscript number in the file name.

Note: Some software packages leave a considerable margin around the `.eps` figures. You may have to tune the `BoundingBox` by hand. It can be made visible using the `bb.ps` PostScript program, which you will find on almost any FTP server.

Also, if you use the predecessors of the `graphics` bundle (`psfig`, `epsf`) you may get difficulties in aligning the edges of the figures with the top and the left column margins. You can find a workaround in the demo file.

If you are not able to submit your figures (or tables) as `.eps` files, make sure your submitted hard copies are of excellent camera-ready quality and advise LaTeX to reserve enough space for your external input by using

```
\vspace{<preferred input-height>}
```

instead of the `\includegraphics` command or `tabular` environment.

3.2 Tables

Table columns should be set flush left. Vertical lines are normally not necessary and should be inserted only in exceptional cases for the sake of clarity.

For further information you will find a complete description of the table and tabular environment in *LaTeX User's Guide & Reference Manual* (2nd ed.), by Leslie Lamport.

The height of each table including the caption must not exceed 23.5 cm.

3.2.1 Tables not coded with LaTeX

If you do not code your tables with LaTeX but prefer to have them reproduced separately, send them as `.eps` files and proceed as described for figures in Section 3.1, but without the `\resizebox` command.

Sample input:

```
\begin{table}
  \caption[ ]{... text of caption ...}
  \vspace{<height> cm}
\end{table}
```

The caption should always be placed above the table.

4 References

For overall information on the reference environment see the *LaTeX User's Guide & Reference Manual*.

Journal names should be abbreviated if possible in the simplified form or using standard abbreviations (see Appendix A on p. 15).

4.1 The use of BibTeX

The use of BibTeX is wide spread. Many authors have accumulated large databases for their bibliographic references. For the A&A we suggest the `astron.bst` BibTeX style. It was developed by Sake J. Hogeveen from 1990 onwards. Using it you will generate your references in the exact A&A format automatically via BibTeX from your bibliographic database.

You will find the `astron` package on our server as well as on the well-known sources for TeX and its friends. It comes with complete documentation (`astdoc.tex`) as well as a demo file for LaTeX and an example database (`example.tex`, `example.bib`).

This documentation is not intended as an introduction to BibTeX, nor to LaTeX. You are assumed to be familiar with both and the combination of them. If you are not, BibTeX is documented by its author, Oren Patashnik. The manual comes with each distribution of BibTeX. It explains how BibTeX should be used, and how style files can be created or adapted.

If you only want to use the `astron` bibliography style, the information in *A BibTeX Style for Astronomical Journals* (`astdoc.tex`) and the LaTeX *User's Guide and Reference Manual* is sufficient.

For the online hyper-text versions of A&A articles the `astron` style will automatically generate a uniform 19-digit code to provide a unique and traceable representation of a bibliographic reference following the SIMBAD and NED convention for bibliographic reference coding (Bibcode). It will be used to check the existence of an abstract and to enable linking to the astrophysics data system abstract servers.

After downloading and installing the `astron` package you can make use of your bibliographic database, leaving the selection and formatting of the references up to BibTEX and LATEX. For that just add the line

```
\usepackage{astron}
```

to your preamble and the following code where the reference section is to appear:

```
\bibliographystyle{astron}
\bibliography{mnemonic,example}
```

4.2 References made without BibTEX

If you cannot use BibTEX see the *LATEX User's Guide & Reference Manual*, for general information on the reference environment.

Journal names should still be abbreviated to the standard abbreviations (see Appendix A).

4.3 Citations in the text

References are normally cited in the text by placing the name(s) and the year, without any comma between them, in parentheses. If there are two authors for one citation, both names should be given, separated by an ampersand (&). If there are more than two authors, only the first name should be given, followed by "et al.". Commas should be used only to separate two or more years linked with one author (author group). If two or more citations are made in one set of parentheses, they should be separated by a semi-colon. If more than one citation for a particular author (author group) is made for the same year, "a", "b", "c", etc. should be added to the year. If citations are made within the normal running text, only the year(s) should be placed in parentheses. The following examples illustrate the required style:

> (Copernicus 1986), (Copernicus & Galilei 1988)
> (Hubble et al. 1985; Newton et al. 1987; Ptolemaus & Copernicus 1988a, 1988b, 1992)
> Recently Galilei et al. (1991, 1992) showed that ...

Authors' initials are permitted only in exceptional cases; for example, to distinguish between two authors with the same surname. Each literature citation made in the text should have a corresponding entry in the *References* at the end of the paper (see Sect. 4.4 below). For frequently cited papers an abbreviated form of citations is recommended, e.g., Paper I, Paper II (if appropriate) or by the initial letters of the authors' surnames.

4.4 The reference list

The reference list should contain all the references cited in the text, ordered alphabetically by surname (with initials following). If there are several references to the same first author, they should be entered according to the following scheme:

1. One author: chronologically
2. Author, one co-author: alphabetically by co-author, then chronologically
3. Author, two or more co-authors: chronologically.

Please always use the LaTeX conventions of `\bibitem` with a label, together with `\cite`. This is necessary to produce hyper-links in the HTML version of your paper.

Sample input:

```
The results in this section are a refined version of
Caraveo (\cite{caraveo}); the minimality result
of Proposition~14 was the first of its kind.
```

Then the `\bibitem` entry of the `thebibliography` environment should read as follows.

Sample input:

```
\begin{thebibliography}{}  % (do not forget {})
\bibitem[1995]{caraveo}
  Caraveo, P.: 1995, Isolated Neutron Stars and Their Emission
  throughout the Electric Magnetic Spectrum. In: 17th
  Texas Symposium on Relativistic Astrophysics and Cosmology,
  Bohringer H., Morfill G.E., Tr\"umper J. (eds.), Ann. of NY
  Academy of Sciences, vol. 759, 246
\bibitem[1995]{day}
  Day, C., Arnaud, K., Ebisawa, K., et al., 1995,
  The ABC guide to
  ASCA Data Reduction, NASA Goddard Space Flight Center
\bibitem[1994]{goldwurm}
  Goldwurm, A., Cordier, B., Paul, J., et al., 1994,
  Nature 371, 589
\bibitem[1988]{white}
  White, N.E., Stella, L., Parmar, A.N., 1988, in press
\end{thebibliography}
```

Sample output:

References

Caraveo, P.: 1995, Isolated Neutron Stars and Their Emission throughout the Electric Magnetic Spectrum. In: 17th Texas Symposium on Relativistic Astrophysics and Cosmology, Bohringer H., Morfill G.E., Trümper J. (eds.), Ann. of NY Academy of Sciences, vol. 759, 246

Day, C., Arnaud, K., Ebisawa, K., et al., 1995, The ABC guide to ASCA Data Reduction, NASA Goddard Space Flight Center
Goldwurm, A., Cordier, B., Paul, J., et al., 1994, Nature 371, 589
White, N.E., Stella, L., Parmar, A.N., 1988, in press

5 General typing rules

5.1 Fine tuning of the text

The following should be used to improve the readability of the text:

`\,`	a thin space, e.g. between thousands in numbers with more than 5 digits; a line division will not be made following this space,
`--`	en-dash; two hyphens, without a space at either end,
␣`--`␣	Please note: in TEX, `---` gives an em-dash "—"; Springer does not use this, but rather the shorter en-dash *with* spaces, i.e. space, two hyphens, for an en-dash, space, to give a "Springer em-dash".
`-`	hyphen; no space at either end,
`$-$`	minus, in the text *only*,
`~`	fixed space, e.g. between parts of names.

Their use is best explained in the following example.

Sample input:

```
20\,000 km, 1\,000\,000 s, NGC 468\,324
1950--1985, p.~11--21
this -- written on a computer -- is now printed
signal-to-noise ratio, early-type, metal-poor, non-relativistic
$-30$ K, $-5^{\circ}$C
Dr.~h.c.~Rockefeller-Smith and Prof.~Dr.~Mallory
```

Sample output:

20 000 km, 1 000 000 s, NGC 468 324
1950–1985, p. 11–21
this – written on a computer – is now printed
signal-to-noise ratio, early-type, metal-poor, non-relativistic
−30 K, −5°C
Dr. h.c. Rockefeller-Smith and Prof. Dr. Mallory

5.2 Special typefaces

Normal type (roman) need not be specified. *Emphasize* (`\emph{Emphasize}`) should be used for emphasis in the text.

In addition, there are the following commands.

`\vec{Symbol}`

Vectors may only appear in math mode. Examples are:

```
$\vec{A} \times \vec{B} \cdot \vec{C}$,
```

which yields $\boldsymbol{A} \times \boldsymbol{B} \cdot \boldsymbol{C}$ and

```
$\vec{A\/}^{\rm T} \otimes \vec{B} \otimes \vec{\hat D}$,
```

which yields $\boldsymbol{A}^{\mathrm{T}} \otimes \boldsymbol{B} \otimes \hat{\boldsymbol{D}}$.

`\tens{Symbol}`

Tensors may only appear in math mode. Example: `\tens{ABC}` yields ABC.

`\ion{<element symbol>}{<degree of ionization>}`

The degree of ionization in the `\ion` command has to be given as lower case roman numerals (e.g. `\ion{H}{ii}` which yields H II).

```
\element[<electrical charge>][<number of nucleons>]
    [<number of protons>][<number of neutrons>]{<element symbol>}
```

Note, that if you want to have for example ^{13}C, the last two optional arguments may be omitted: `\element[][13]{C}`.

5.3 Footnotes

Footnotes end with a full stop. Footnotes within the text should be coded as

`\footnote{<text>}`

with *no* blank before `\footnote`.

5.4 Mathematical formulas

All equations that you are refering to with `\ref` must have the corresponding `\label` – please use this mechanism only. Punctuate a displayed equation in the same way as ordinary text.

Note that the sizes of the parentheses or other delimiter symbols used in equations should ideally match the height of the formulas being enclosed. This is automatically taken care of by the following LaTeX commands, e.g. `\left(` or `\left[` and `\right)` or `\right]`.

5.4.1 Italic and roman type in the math mode

In math mode LaTeX treats all letters as though they were mathematical or physical variables; hence they are typeset in italics. However, any textual elements within formulas should be set in roman. Roman should also be used for subscripts and superscripts *in formulas* where these are merely labels and not in themselves variables, e.g.

`$T_\mathrm{eff} = 5\,10^{9} \mathrm{K}$`	produces	$T_{\mathrm{eff}} = 5\,10^{9}\mathrm{K}$
`$T_\mathrm{K}$`	produces	T_{K} (K = Kelvin)
`$m_\mathrm{e}$`	produces	m_{e} (e = electron)

However, do not use roman if the subscripts or superscripts represent variables, e.g. $\sum_{i=1}^{n} a_i$.

Please ensure that *physical units* (e.g. pc, erg s^{-1} K, cm^{-3}, W m^{-2} Hz^{-1}, m kg s^{-2} A^{-2}) and *abbreviations* such as Ord, Var, GL, SL, sgn, const. are always set in roman type with an appropriate inter-word spacing. To ensure this use the `\mbox` command: `\mbox{Hz}`. On p. 44 of the *LaTeX User's Guide & Reference Manual* (2nd ed.) by Leslie Lamport you will find the names of common mathematical functions, such as log, sin, exp, max and sup. These should be coded as `\log`, `\sin`, `\exp`, `\max`, `\sup` and will then automatically appear in roman.

In order to distinguish "d" used as the "differential sign" and "e" used as the "exponential function" from normal variables, set these letters in roman if used in this context.

Chemical symbols and formulas should be set in roman, e.g. Fe not Fe, H_2O not H_2O, Hα not $H\alpha$.

5.5 Astronomical objects

SIMBAD the astronomical database and ALADIN the interactive deep sky mapping facility at CDS Strasbourg create anchors for astronomical objects cited in the A&A. To facilitate their indexing you, being best placed to start the proces, should surround any astronomical object in your text as well as in small tables with the command

```
\object{<objectname>}
```

This command simply prints out its argument and adds the thus marked element to the list of hyper-linked astronomical objects and should be repeated for each object.

In the `referee` version of your article the list of your objects will automatically appear at the end (after the references). For the final (two-column) version you could use the command `\listofobjects` directly before the end of your document to get the list of known objects printed. LaTeX will write an auxiliary file with the extension `obj` to prepare that list.

5.6 Signs and characters

You may need to use special signs. The available ones are listed in the *LaTeX User's Guide & Reference Manual* (2nd ed.). We have created further common astronomy symbols:

In	Explanation	Out	In	Explanation	Out
`\sun`	sun symbol	$\odot$	`\fs`	fraction of second	$\overset{\mathrm{s}}{.}$
`\degr`	degree	$^\circ$	`\fdg`	fraction of degree	$\overset{\circ}{.}$
`\diameter`	diameter	$\oslash$	`\fp`	fraction of period	$\overset{\mathrm{p}}{.}$
`\sq`	square	$\square$	`\farcs`	fraction of arcsecond	$\overset{''}{.}$
`\fd`	fraction of day	$\overset{\mathrm{d}}{.}$	`\farcm`	fraction of arcmin	$\overset{'}{.}$
`\arcsec`	arcsecond	$''$	`\fh`	fraction of hour	$\overset{\mathrm{h}}{.}$
`\arcmin`	arcminute	$'$	`\fm`	fraction of minute	$\overset{\mathrm{m}}{.}$

A Simplified abbreviations of frequently used journals

AJ	Astronomical Journal (the)
ARA&A	Annual Review of Astronomy and Astrophysics
AZh	Astronomiceskij Zhurnal
A&A	Astronomy and Astrophysics (Letters indicated by number)
A&AR	Astronomy and Astrophysics Review (the)
A&AS	Astronomy and Astrophysics Supplement Series
Acta Astron.	Acta Astronomica
Acta Astron. Sin.	Acta Astronomica Sinica
Afz	Astrofizica
ApJ	Astrophysical Journal (the) (Letters indicated by number)
ApJS	Astrophysical Journal Supplement Series (the)
Ap&SS	Astrophysics and Space Science
Ark. Astron.	Arkiv for Astronomi
Astron. Nachr.	Astronomische Nachrichten
Aust. J. Phys.	Australian Journal of Physics
Aust. J. Phys. Astrophys. Suppl.	Australian Journal of Physics Astrophysics Supplement
BAAS	Bulletin of the American Astronomical Society
C. R. Acad. Sci. Paris	Comptes Rendus de l'Académie des Science
Chin. Astron.	Chinese Astronomy
IAU Circ.	International Astronomical Union, Circular
Icarus	Icarus
Ir. Astron. J.	Irish Astronomical Journal
J. R. Astron. Soc. Can.	Journal of the Royal Astronomical Society of Canada
JA&A	Journal of Astronomy and Astrophysics
MNRAS	Monthly Notices of the Royal Astronomical Society
Mem. R. Astron. Soc.	Memoirs of the Royal Astronomical Society
Mem. Soc. Astron. Ital.	Memorie della Societa Astronomica Italiana
Mitt. Astron. Ges.	Mitteilungen der Astronomischen Gesellschaft
Mon. Notes Astron. Soc. S. Afr.	Monthly Notes of the Astronomical Society of Southern Africa
Nat	Nature
Observatory	Observatory (the)
PASJ	Publications of the Astronomical Society of Japan

PASP	Publications of the Astronomical Society of the Pacific
PASPC	Ditto, Conference Proceedings
Phil. Trans. R. Soc. London, Ser. A	Philosophical Transactions of the Royal Society of London, Series A
Proc. Astron. Soc. Aust.	Proceedings of the Astronomical Society of Australia
QJRAS	Quarterly Journal of the Royal Astronomical Society
Rev. Mex. Astron. Astrofis.	Revista Mexicana de Astronomia y Astrofisica
Ric. Astron. Specola Vaticana	Ricerche Astronomiche. Specola Vaticana
Sci	Science
Sci. Am.	Scientific American
Sky Telesc.	Sky and Telescope
Space Sci. Rev.	Space Science Reviews
SvA	Soviet Astronomy