
Astronomy & Astrophysics

Document Class V6.1

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Contents

1	Getting started	2
1.1	TeXnical background information	2
2	The document structure	2
2.1	Loading the class	2
2.1.1	Referee version	2
2.1.2	Research notes	3
2.1.3	Letters	3
2.1.4	Long lists of authors and institutes	3
2.2	The TX fonts	3
2.3	The title	3
2.4	Names of authors	4
2.5	Addresses	4
2.6	Footnotes to the title block	4
2.7	Dates of receipt and acceptance	4
2.8	Abstract	5
2.9	Keywords	5
2.10	Typesetting the header	5
2.11	Changing the running head	6
2.12	An example of the beginning of an article	6
2.13	Acknowledgements	7
2.14	Appendices	7
2.15	Paper printed on one column	8
3	Floating objects	8
3.1	Figures	8
3.2	Tables	10
3.2.1	Simple A&A tables	10
3.2.2	Tables larger than a page	11
3.2.3	Tables not coded with L ^A T _E X	12
4	References	13
4.1	Citations in the text	13
4.2	The reference list	13
5	How to use BibT_EX for A&A	14
5.1	Citations in the text with Natbib	15
6	Online material	15

7	General typing rules	17
7.1	Fine tuning of the text	17
7.2	Special typefaces	18
7.3	Footnotes	19
7.4	Mathematical formulas	19
7.5	Astronomical objects	20
7.6	Signs and characters	20
A	Simplified abbreviations of frequently used journals	21

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 L^AT_EX 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 as well as the `\object` command (see Sect. 7.5) 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 T_EXnical background information

This document class was derived from the L^AT_EX 2_ε `article.cls` based on T_EX version 3.141 and L^AT_EX 2_ε. Hence formulas and text are typed using the standard L^AT_EX 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.

2.1.1 Referee version

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. 7.5 below):

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

2.1.2 Research notes

Research notes are short papers that contain either new results as an extension of work reported in a previous paper, or limited observations not urgent enough to be published as a Letter, or useful calculations that have no definite immediate astrophysical applications. An option has been added:

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

The word (Research Note) is automatically added in the title and (RN) in the running title.

2.1.3 Letters

Important new results that require rapid publication can be submitted as Letters. Use the following option:

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

2.1.4 Long lists of authors and institutes

In articles that are the result of consortia, the number of authors and the list of affiliations are very long. Use the following option:

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

In this case, all the institutes are set below the references.

2.2 The TX fonts

This journal is printed using the Postscript TX Times-fonts. The TX fonts consist of virtual text roman fonts using Adobe Times with some modified and additional text symbols. The TX fonts are distributed under the GNU public license and are available in the distributions of L^AT_EX since December 2000. As the use of the TX fonts results in a slightly different page make-up from CM fonts, we encourage you to use TX fonts. It is as simple as :

```
\documentclass{aa} \usepackage{txfonts} ... \begin{document}
```

2.3 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 across two or more lines, please insert linebreaks (\\).

2.4 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.

2.5 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> ...}
```

2.6 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 `\fmmsep` to typeset the comma separating the asterisks (see demo file).

Stating the present address of an author is done with

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

2.7 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.

2.8 Abstract

A new concept “Structured Abstract” is implemented with the version 6.0. Just like a traditional abstract, a structured abstract summarizes the content of the paper, but it does make the structure of the article explicit and visible. For doing so, the structured abstract uses headings that define several short paragraphs. Three paragraphs, entitled respectively Aims, Methods, and Results, are mandatory. When appropriate, the structured abstract may use an introductory paragraph entitled Context, and a final paragraph entitled Conclusions.

Proceed as follows:

```
\abstract
{}{}{}{}{}
```

The second, third and fourth arguments have to be completed. The first one and the last one might be left empty. For example:

```
\abstract
{}
{Text of aims}
{Text of methods}
{Text of results}
{}
```

The abstract should accurately summarize the paper’s content, be limited to 300 words, and be self-contained (no references, no abbreviations or acronyms except for the truly obvious and familiar ones).

A counter of words has been added with an error message for an abstract exceeding 300 words.

Citations in an abstract display an error message.

Please, note that for this class, **abstract** is a command with 5 arguments and not an environment.

Remark : to ensure the portability of articles written with previous versions and a non-structured abstract, an option

`\documentclass[oldversion]{aa}` has been added.

2.9 Keywords

For the sake of simplicity and uniformity, authors should choose not more than six key words. The heading “Key words” appears automatically. The individual key words should be separated by an en-dash (--) with one blank before and after.

```
\keywords{<keyword -- keyword -- keyword ...>}
```

2.10 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.

2.11 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

2.12 An example of the beginning of an article

```
\documentclass{aa}

\begin{document}

\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, \email{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}

\abstract
    % context heading (optional), leave it empty if necessary
    {To investigate the physical nature of the ‘nuc\–leated instability’ of
    proto giant planets...}
    % aims heading (mandatory)
    {It is shown that stability
    depends only upon the equations of state...}
    % methods heading (mandatory)
    {The stability equations of state are
    calculated for solar composition...}
    % results heading (mandatory)
    {Vibrational instability is found to be a common phenomenon
    at temperatures lower...}
    % conclusions heading (optional), leave it empty if necessary
    {}

\keywords{interstellar medium: jets and outflows --
    interstellar medium: molecules -- stars: pre-main-sequence}}

\maketitle

```

2.13 Acknowledgements

For acknowledgements use the environment:

<pre>\begin{acknowledgements} \end{acknowledgements}</pre>
--

2.14 Appendices

If you enter the command

<pre>\begin{appendix}... \end{appendix}</pre>

the sections that follow will be numbered with capital letters.

2.15 Paper printed on one column

Some papers contain a lot of large mathematical formulae that may be difficultly written for 2 columns format and not really readable. In this case, the authors can submit their articles using the option `onecolumn`. After the submission, the editors will confirm if the article will actually be printed on 1 column, right across the page.

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

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 conforms 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.¹

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 our Web site and the instructions for authors. 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 by using the `graphicx` package, which comes along with the standard L^AT_EX 2_ε distribution. Include the package in the preamble of your document as follows:

```
\usepackage{graphicx}
```

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*`.

¹It is necessary to have proper line endings in the header of the file to have the commands recognizable for T_EX or dvips. The different end of line representations cause problems e.g. when creating the `.eps` files on a Macintosh but T_EXing your manuscript on a UNIX or PC operating system.


```

\begin{figure*}
\centering
\includegraphics[width=17cm]{<yourfilename.eps>}
\caption{<Your caption text...>}.}
\label{<Your label>}
\end{figure*}

```

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

```

\begin{figure*}
\sidecaption
\includegraphics[width=12cm]{<yourfilename.eps>}
\caption{<Your caption text...>}.}
\label{<Your label>}
\end{figure*}

```

For figures available in electronic form only, please proceed as follows:

```

\title{Optimality relationships
\thanks{Figures 5-10 are only available in electronic form via
http://www.edpsciences.org}
}

```

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 have to be centered, 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 aa.accepted@edpsciences.org. 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 with the help of `ghostview`, for example. It can be automatically changed using the `psfixbb` command which you will find on almost any FTP server.

Also, if you use the predecessors of the `graphicx` bundle (`psfig`, `epsf`) you may get difficulties in aligning the edges of the figures with the top and the left column margins.

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 L^AT_EX to reserve enough space for your external input by using

```

\vspace{<preferred input-height>}

```

instead of the `\includegraphicx` 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.

The height of each table including the caption must normally not exceed 23.5 cm and the caption should always be placed above the table.

For tables available at the CDS, please proceed as follows:

```
\title{Optimality relationships
\thanks{Table 1 is only available in electronic at the CDS via
anonymous ftp to cdsarc.u-strasbg.fr (130.79.125.5)
or via http://cdsweb.u-strasbg.fr/Abstract.html}
}
```

To change the number of a table, especially when some tables of a paper are only available at the CDS, use:

```
\setcounter{table}{2}
% your table will be 3
\begin{table}
...
\end{table}
```

Note that L^AT_EX with `\begin{table}` will always add 1 to the counter.

3.2.1 Simple A&A tables

Tables are created using the `table` environment.

```
\begin{table}
\caption{Nonlinear Model Results} % title of Table
\label{table:1} % is used to refer this table in the text
\centering % used for centering table
\begin{tabular}{c c c c} % centered columns (4 columns)
\hline\hline % inserts double horizontal lines
HJD & $E$ & Method\#2 & Method\#3 \\ % table heading
\hline % inserts single horizontal line
1 & 50 & $-837$ & 970 \\ % inserting body of the table
2 & 47 & 877 & 230 \\
3 & 31 & 25 & 415 \\
4 & 35 & 144 & 2356 \\
5 & 45 & 300 & 556 \\
\hline %inserts single line
\end{tabular}
\end{table}
```

To produce tables that extend across both columns, use the `table*` environment.

If a horizontal line is required in the table, the `\cline{n-m}` command is used to draw a horizontal line from the left side of the column n to the right side of the column m .

The `\multicolumn{num}{col}{text}` command is used to combine the following `num` columns into a single column with their total width.

Table 1: Nonlinear Model Results

HJD	E	Method#2	Method#3
1	50	−837	970
2	47	877	230
3	31	25	415
4	35	144	2356
5	45	300	556

```
\hline\hline           % inserts double horizontal lines
HJD & \multicolumn{3}{c}{Methods}\\
\hline                % inserts single horizontal line
```

The output is:

HJD	Methods		
1	50	−837	970
2	47	877	230
3	31	25	415
4	35	144	2356
5	45	300	556

Some examples of a table with footnotes or a rotated table in landscape are given in the `aa.dem` file.

3.2.2 Tables larger than a page

Tables larger than a page should be composed at the end of the document. In the text, at the place where the large table should appear, add the command: `\addtocounter{table}{1}`. Tables counters will be well numbered.

Authors may use one of the two dedicated packages `supertabular` and `longtable`. Put the package in the preamble of your document as follows:

```
\usepackage{longtable} or \usepackage{supertabular}
```

and write your long table at the end.

- `supertabular`

```
\end{thebibliography}
% end of the main text
\clearpage
\onecolumn
% if table 2
\setcounter{table}{2}
\begin{supertabular}
...
\end{supertabular}
```

- `longtable`

`aa.cls` has adapted a command `\longtab{}{}` to this package.

```

\end{thebibliography}
% if table 2
\longtab{2}{
\begin{longtable}{lllrrrr}
\caption{\label{kstars} Sample stars with absolute magnitude}\\
\hline\hline
Catalogue& $M_{\text{V}}$ & Spectral & Distance & Mode & Count Rate \\
\hline
\endfirsthead
\caption{continued.}\\
\hline\hline
Catalogue& $M_{\text{V}}$ & Spectral & Distance & Mode & Count Rate \\
\hline
\endhead
\hline
\endfoot
G1 33      & 6.37 & K2 V & 7.46 & S & 0.043170\\
G1 66AB    & 6.26 & K2 V & 8.15 & S & 0.260478\\
G1 68      & 5.87 & K1 V & 7.47 & P & 0.026610\\
           &      &      &      & H & 0.008686\\
G1 86
\footnote{Source not included in the HRI catalog. See Sect.~5.4.2 for details.}
& 5.92 & K0 V & 10.91 & S & 0.058230\\
\end{longtable}
}% End \longtab

```

For large table in landscape format, use `\usepackage{longtable,landscape}` and write your table at the end as follow:

```

\end{thebibliography}
% if table 2
\longtabL{2}{
\begin{landscape}
\begin{longtable}{lrcrrrrrrrrl}
...
\end{longtable}
\end{landscape}
}% End longtabL

```

3.2.3 Tables not coded with L^AT_EX

If you do not code your tables with L^AT_EX but prefer to have them reproduced separately, send them as .eps files and proceed as described for figures in Section 3.1.

For further information you will find a complete description of the table and tabular environment in *The L^AT_EX Companion* (2nd ed.), by Frank Mittelbach and Michel Goossens.

4 References

Journal names should be abbreviated if possible in the simplified form or using standard abbreviations (see Appendix A on p. 21).

For further information on the references, see *The L^AT_EX Companion* (2nd ed.), by Frank Mittelbach and Michel Goossens.

4.1 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. 4.2 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.

4.2 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 note that for papers that have more than five authors, only the first three should be given, followed by “et al.”

Please always use the L^AT_EX 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

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, ed.
  H. Bohringer, G. E. Morfill, \& J. Tr\"umper, Ann. of NY
  Academy of Sciences, vol. 759, 246
\bibitem[1994]{goldwurm}
  Goldwurm, A., Cordier, B., Paul, J., et al. 1994,
  Nature, 371, 589
\bibitem[2000]{Matt}
  Matthews, L. D., \& van Driel, W. 2000, A\&AS, in press
\bibitem[1992]{terlev}
  Terlevich, R. 1992, in ASP Conf. Ser. 31, Relationships between
  Active Galactic Nuclei and Starburst Galaxies,
  ed. A. V. Filippenko, 13
\bibitem[1995]{tytler}
  Tytler, D., Fan, X. M., Burlers, S., et al. 1995, in QSO
  Absorption Lines, ed. G. Meylan (Garching: ESO), 289
\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, ed. H. Bohringer, G. E. Morfill, & J. Trümper, Ann. of NY Academy of Sciences, vol. 759, 246
- Goldwurm, A., Cordier, B., Paul, J., et al. 1994, Nature, 371, 589
- Matthews, L. D., & van Driel, W. 2000, A&AS, in press
- Terlevich, R. 1992, in ASP Conf. Ser. 31, Relationships between Active Galactic Nuclei and Starburst Galaxies, ed. A. V. Filippenko, 13
- Tytler, D., Fan, X. M., Burlers, S., et al. 1995, in QSO Absorption Lines, ed. G. Meylan (Garching: ESO), 289

5 How to use BibT_EX for A&A

Bibliography style in A&A follows the APJ style. Authors who are used to work with BIBT_EX may compose their bibliography using some packages, adapted for this style.

The `Natbib` package is an implementation of the \LaTeX `\cite` command, which works with both author–year and numerical citations. It is compatible with the standard bibliographic style files, such as `plain.bst`, as well as with the `aa.bst` style, included in the `A&A` package.

The installation is a simple matter. You will need the `Natbib.sty` style file and the `aa.bst` file. There are only two steps:

1. Put the appropriate ‘sty’, ‘bst’, and ‘bib’ files where \LaTeX / \BibTeX can see them.
2. Run \LaTeX and \BibTeX .

In the file, put:

```
\documentclass{aa}
...
\usepackage{natbib}
\bibpunct{(}{)}{;}{a}{f}{,} % to follow the A&A style
...
% for the bibliography, at the end
\bibliographystyle{aa} % style aa.bst
\bibliography{Yourfile} % your references Yourfile.bib
\end{document}
```

Don’t forget to submit the `.bbl` (and not the `.bib`) file.

5.1 Citations in the text with Natbib

The `Natbib` package has two basic citation commands, `\citet` for *textual* citations and `\citep` for *parenthetical* citations, respectively. These commands can have one or two optional arguments to add some text before and after the citation.

<code>\citet{jon90}</code>	\Rightarrow	Jones et al. (1990)
<code>\citep{jon90}</code>	\Rightarrow	(Jones et al. 1990)
<code>\citep[see][]{jon90}</code>	\Rightarrow	(see Jones et al. 1990)
<code>\citep[see][chap.~2]{jon90}</code>	\Rightarrow	(see Jones et al. 1990, chap. 2)

Multiple citations can be made, as usual, by including more than one citation key in the `\cite` command argument.

<code>\citet{jon90,jam91}</code>	\Rightarrow	Jones et al. (1990); James et al. (1991)
<code>\citep{jon90,jam91}</code>	\Rightarrow	(Jones et al. 1990; James et al. 1991)
<code>\citep{jon90,jon91}</code>	\Rightarrow	(Jones et al. 1990, 1991)
<code>\citep{jon90a,jon90b}</code>	\Rightarrow	(Jones et al. 1990a,b)

6 Online material

Some material will only be published electronically (ftp and WWW):

- large tables at the CDS
- figures, colour pictures, appendices, movies, etc. at EDP Sciences.

Access to the online material is only granted to subscribers. At the request of the Editor-in-Chief, they may be published both electronically and as hard copy.

The material is displayed as HTML pages, if necessary including links to files under other formats, i.e. MPEG. Whenever the format of the online material allows it (text appendix, tables, etc.), it can be included in the .pdf version of the article as a separate section at the end. This section has special page numbering independent of that in the paper copy.

- Text appendices
Online appendices have to be placed at the end after `\end{thebibliography}`. Add the `\Online` command and write your text (this section will be published as received, without any changes by the publisher).

```
\end{thebibliography}

\Online

\begin{appendix} %First online appendix
\section{Background galaxy number counts}
...
\begin{figure*}
\centering
\includegraphics[width=16.4cm,clip]{1787f24.ps}
\caption{Plotted above...}\label{appfig}
\end{figure*}
...
\end{appendix}

\begin{appendix} %Second online appendix
...
\end{appendix}
\end{document}
```

- Some tables or figures are in the printed version and some are only in the electronic version. Leave all the tables or figures in the text, at their right place, and use the commands `\onlfig{}{}` and `\onltab{}{}`. These elements will be automatically placed at the end in the section Online material.

```
\documentclass{aa}
...
\begin{document}
...
\begin{figure*}%f1
\includegraphics[width=10.9cm]{1787f01.eps}
\caption{Shown in greyscale is a...}\label{301}}
\end{figure*}
...
% Figure 2 and 3 available electronically only
\onlfig{2}{
\begin{figure*}%f2
```



```

\includegraphics[width=11.6cm]{1787f02.eps}
\caption {Shown in greyscale...} \label{018}
\end{figure*}
}% end of onlfig
...
\onlfig{3}{
\begin{figure*}%f3
\includegraphics[width=11.2cm]{1787f03.eps}
\caption{Shown in panels...} \label{059}
\end{figure*}
}% end of onlfig
...
\begin{table}%t1
\caption{Complexes characterisation.}\label{starbursts}
\begin{tabular}{lccc}
...
\end{tabular}
\end{table}
...
% Figure 4 available electronically only
\onlfig{4}{
\begin{figure*}%f4
\includegraphics[width=11.2cm]{1787f04.eps}
\caption{Shown in panels...} \label{38}}
\end{figure*}
}% end of onlfig
...
% Table 2 available electronically only
\onltab{2}{
\begin{table*}%t2
\caption{List of the LMC stellar complexes...}\label{Properties}
\begin{tabular}{lcccccccc}
...
\end{tabular}
\end{table*}
}% end of onltab

```

Some other examples of large, online tables are also given in the `aa.dem` file.

7 General typing rules

7.1 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 4 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 “—”; we do not use this, but rather the shorter en-dash *with* spaces, i.e. space, two hyphens, for an en-dash, space, to give an “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, HD 174\,638
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
```

7.2 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 $\mathbf{A} \times \mathbf{B} \cdot \mathbf{C}$ and

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

which yields $\mathbf{A}^{\rm T} \otimes \mathbf{B} \otimes \hat{\mathbf{D}}$.

`\tens{Symbol}`

Tensors may only appear in math mode. Example: `\tens{ABC}` yields \mathbf{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}{iii}` which yields H III).

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

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

7.3 Footnotes

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

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

with *no* blank before `\footnote`.

7.4 Mathematical formulas

All equations that you are referring 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 L^AT_EX commands, e.g. `\left(` or `\left[` and `\right)` or `\right]`.

In math mode L^AT_EX 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.

<code>\$T_{\mathrm{eff}} =</code>		
<code>5\times 10^{9}\ \mathrm{K}\$</code>	produces	$T_{\mathrm{eff}} = 5 \times 10^9 \text{ K}$
<code>\$T_{\mathrm{K}}\$</code>	produces	T_{K} (K = Kelvin)
<code>\$m_{\mathrm{e}}\$</code>	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 *L^AT_EX 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*, H₂O not *H₂O*, H α not *H α* .

7.5 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 process, 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 or in the final (two-column) version the list of your objects will automatically appear at the end (after the references or your online material). \LaTeX will write an auxiliary file with the extension `obj` to prepare that list.

Please, verify this list carefully.

Designations of astronomical objects are often confusing. Astronomical designations (also called Object Identifiers) have been collected and published by Lortet and collaborators in Dictionaries of Nomenclature of Celestial Objects outside the solar system (1994A&AS..107..193L). The information service available at <http://vizier.u-strasbg.fr/cgi-bin/Dic> is the electronic look-up version of the Dictionary which is updated on a regular basis; it provides full references and usages about 13211 different acronyms.

7.6 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
<code>\sun</code>	sun symbol	\odot	<code>\fs</code>	fraction of second	''^{s}
<code>\degr</code>	degree	$^{\circ}$	<code>\fdg</code>	fraction of degree	''°
<code>\diameter</code>	diameter	\varnothing	<code>\fp</code>	fraction of period	''^{p}
<code>\farcs</code>	fraction of arcsecond	$\text{''}^{\text{''}}$	<code>\farcm</code>	fraction of arcmin	$\text{''}^{\text{'}}$
<code>\fd</code>	fraction of day	''^{d}	<code>\fh</code>	fraction of hour	''^{h}
<code>\arcsec</code>	arcsecond	$\text{''}^{\text{''}}$	<code>\fm</code>	fraction of minute	''^{m}
<code>\arcmin</code>	arcminute	$\text{''}^{\text{'}}$			

In	Out	In	Out
<code>\la</code>	\rightharpoonleft	<code>\ga</code>	\rightharpoonright
<code>\cor</code>	\Rightarrow	<code>\sol</code>	$\rightharpoonleft \rightharpoonright$
<code>\sog</code>	\rightharpoonleft	<code>\lse</code>	$\rightharpoonleft \rightharpoonright \rightharpoonleft$
<code>\gse</code>	$\rightharpoonleft \rightharpoonright$	<code>\grole</code>	$\rightharpoonleft \rightharpoonright \rightharpoonleft \rightharpoonright$
<code>\leogr</code>	$\rightharpoonleft \rightharpoonright \rightharpoonleft$	<code>\loa</code>	$\rightharpoonleft \rightharpoonright \rightharpoonleft \rightharpoonright \rightharpoonleft$
<code>\goa</code>	$\rightharpoonleft \rightharpoonright \rightharpoonleft \rightharpoonright$	<code>\getsto</code>	\updownarrow
<code>\lid</code>	\Rightarrow	<code>\gid</code>	\Rightarrow

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	Astrofizika
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.	Australian Journal of Physics
Astrophys. Suppl.	Astrophysics Supplement
BAAS	Bulletin of the American Astronomical Society
Bull. astr. Inst. Czechosl.	Bulletin of the Astronomical Institutes of Czechoslovakia
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	Monthly Notes of the Astronomical Society
Astron. Soc. S. Afr.	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

There are commands for many of the most frequently-referenced journals so that authors may use the markup rather than having to look up a particular journal's abbreviation (*see next page*).

<code>\actaa</code>	Acta Astronomica
<code>\aj</code>	Astronomical Journal
<code>\araa</code>	Annual Review of Astron and Astrophys
<code>\apj</code>	Astrophysical Journal
<code>\apjl</code>	Astrophysical Journal, Letters
<code>\apjs</code>	Astrophysical Journal, Supplement
<code>\ao</code>	Applied Optics
<code>\aplett</code>	Astrophysics Letters
<code>\apspr</code>	Astrophysics Space Physics Research
<code>\apss</code>	Astrophysics and Space Science
<code>\aap</code>	Astronomy and Astrophysics
<code>\aapr</code>	Astronomy and Astrophysics Reviews
<code>\aaps</code>	Astronomy and Astrophysics, Supplement
<code>\azh</code>	Astronomicheskii Zhurnal
<code>\baas</code>	Bulletin of the AAS
<code>\bac</code>	Bulletin of the Astronomical Institutes of Czechoslovakia
<code>\bain</code>	Bulletin Astronomical Institute of the Netherlands
<code>\caa</code>	Chinese Astronomy and Astrophysics
<code>\cjaa</code>	Chinese Journal of Astronomy and Astrophysics
<code>\fcp</code>	Fundamental Cosmic Physics
<code>\gca</code>	Geochimica Cosmochimica Acta
<code>\grl</code>	Geophysics Research Letters
<code>\iaucirc</code>	IAU Circulars
<code>\icarus</code>	Icarus
<code>\jcap</code>	Journal of Cosmology and Astroparticle Physics
<code>\jcp</code>	Journal of Chemical Physics
<code>\jgr</code>	Journal of Geophysics Research
<code>\jqsrt</code>	Journal of Quantitative Spectroscopy and Radiative Transfer
<code>\jrasc</code>	Journal of the RAS of Canada
<code>\memras</code>	Memoirs of the RAS
<code>\mnras</code>	Monthly Notices of the RAS
<code>\memsai</code>	Mem. Societa Astronomica Italiana
<code>\na</code>	New Astronomy
<code>\nat</code>	Nature
<code>\nar</code>	New Astronomy Review
<code>\nphysa</code>	Nuclear Physics A
<code>\pra</code>	Physical Review A: General Physics
<code>\prb</code>	Physical Review B: Solid State
<code>\prc</code>	Physical Review C
<code>\prd</code>	Physical Review D
<code>\pre</code>	Physical Review E
<code>\prl</code>	Physical Review Letters
<code>\pasp</code>	Publications of the ASP

<code>\pasj</code>	Publications of the ASJ
<code>\pasa</code>	Publications of the ASA
<code>\physrep</code>	Physics Reports
<code>\physscr</code>	Physica Scripta
<code>\planss</code>	Planetary Space Science
<code>\procspie</code>	Proceedings of the SPIE
<code>\qjras</code>	Quarterly Journal of the RAS
<code>\rmxaa</code>	Revista Mexicana de Astronomia y Astrofisica
<code>\skytel</code>	Sky and Telescope
<code>\solphys</code>	Solar Physics
<code>\sovast</code>	Soviet Astronomy
<code>\ssr</code>	Space Science Reviews
<code>\zap</code>	Zeitschrift fuer Astrophysik