# The `aipproc` class v1.0 for LaTeX 2ε

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**Abstract.** This document describes the functionality and use of the `aipproc` class by explaining its extensions and restrictions compared to the `article` class of standard LaTeX. It is not a manual to be used on its own but should be used together with an introductory manual on LaTeX such as (4).

## CONTENTS



## GENERAL OVERVIEW

The `aipproc` class is a LaTeX 2ε document class for conference proceedings of the American Institute of Physics. It is intended to produce camera-ready copy for direct photo-offset use. The only modification done by the AIP is adding appropriate page numbers.

The class implements the layout as specified in *Instructions for Preparation of Camera Ready Manuscripts* (1). It provides essentially the same markup as implemented by LaTeX's standard `article` class. In addition to this it implements the following:

- extended set of front matter commands,
- automatic placement of floats into column or page areas including turning of table floats by 90° if necessary,
- allows mixing column and page-wide floats without getting the numbering out of sync,
- footnotes will appear below bottom floats,
- support for table notes,
- support for textual page references like "on the next page".

## CLASS DETAILS

### Supported options

As the class is based on the article class of standard LaTeX all reasonable[1] options of this class are supported automatically. In addition there are a number of options unique to the `aipproc` class.

Four options control the selection of fonts in the document; use at most one of them.

**mathptm** Directs the class to use PostScript Times and Symbol fonts (a few missing glyphs are taken from Computer Modern) for math by loading the `mathptm` package.

This option is the default.

* This work was commissioned by the AIP

[1] Reasonable means not conflicting with fixed requirements for the AIP class, e.g., as this class requires 10pt body size option `11pt` and `12pt` are ignored and produce a warning.

**mathtime** Directs the class to use MathTime fonts for math by loading the `mathtime` package. These fonts are commercial so that this option will not work if you don't own them.

**nomathfonts** Directs the class not to set up math fonts (which means using the installation default which is usually Computer Modern). This option is intended in case a special math font setup is loaded in the document preamble.

**cmfonts** Directs the class to use standard Computer Modern fonts for math and text. This does not conform to the specification for this class and is intended for draft preparation in environments where the required fonts are unavailable.

The next options enable textual references; if this is desired select one of them:

**varioref** Loads the `varioref` package (see (2, p.41ff)) allowing to produce textual page references. See section on Cross-references on the following page for details.

**nonvarioref** Disables the `\reftextvario` command so that the strings produced by `varioref` commands will not depend on the number of references seen so far. Implies the varioref option.

Notes to tables can be influenced as follows:

**tnotealph** Produce raised lower case alphabetic marks to indicate table notes.

**tnotesymbol** Use footnote symbols to indicate table notes (default).

Finally there is one standard `article` class option which has its functionality extended:

**draft** Allows `\tableofcontents` and similar commands to work without error message (during development of article). Shows overfull boxes, disables including of graphics for faster printing. It also provides page numbers in the printout.

## Front matter

The class supports the standard article class front matter commands with the following exceptions and additions:

`\title{`*title text*`}`

`\author{`*author name*`}`

The *author name* should not contain the address.

`\affiliation{`*affiliation text*`}`

This `\affiliation` command is unique to the `aipproc` class and is intended to carry the author's address.

`\date{`*date*`}`

The article class also provides the `\date` command which is not used by `aipproc` class. If supplied it will be ignored unless the `draft` option is specified in which case it will show up in a footer line together with the title and the page number to ease document development.

`\maketitle`

This command inserts the actual front matter data. It has to follow the above declarations.

`\begin{abstract}`

The abstract environment can appear before or after the `\maketitle` command.

### *Multiple authors*

No special provision is made in the markup for supporting multiple authors. List all authors within an `\author` declaration separated by appropriate punctuation and/or the word "and". If necessary use `\\` to produce line breaks in the right places.

`\affiliationmark{`*letter/symbol*`}`

If the affiliation for individual authors differ this command can be used to connect authors and address as follows:

```
\author{
 Jonathan A. Smith\affiliationmark{a}
 and Jane M. Brown\affiliationmark{b}
}
\affiliation{
 \affiliationmark{a}Department of
 Molecular Biology  and
 \affiliationmark{b}Department of
 Physics, Princeton University,
 Princeton, New Jersey 08544
}
```

The `\affiliationmark` will print the letter in a small typeface and raise it appropriately to the position of a footnote symbol. It is the responsibility of the author to select appropriate letters.

The `\and` command as defined in the `article` class to separate multiple authors is not supported.

### *Other front matter commands*

The `\tableofcontents`, `\listoffigures`, and `\listoftables` commands are provided but produce (beside output) an error message unless the `draft` option was selected. This is done since the `aipproc` class does not support page numbering and thus the above commands essentially produce incorrect data.

## Headings

The `aipproc` class officially supports three heading levels, i.e., `\section`, `\subsection`, and `\subsubsection`.

It also supports the commands `\paragraph` and `\subparagraph` although the latter heading levels are not part of the `aipproc` class specification and are therefore discouraged.

## Cross-references

Cross-references to page numbers are not possible with the `aipproc` class as the page numbers are determined after production. For this reason the `\pageref` command of LaTeX is disabled by default.

Since headings don't carry numbers they can't be referenced either.

References to tables, figures, and equations are possible using the LaTeX commands `\label` and `\ref`.

However if the class option `varioref` or `nonvarioref` is used, references to page numbers are possible again as they will generate textual references of the form "on the following page" or "on an earlier page" etc. The produced strings are customizable as described in detail in the `varioref` package documentation or in (2, p.41ff).

The class defaults are as follows and can be changed with `\renewcommand` in the document preamble. The `varioref` package normally distinguishes between reference to facing pages and references to pages that need turning over using different strings in these cases. However, since with `aipproc` class class page numbers are not determined at the time of production no assumption can be made that page $x$ and $x+1$ actually fall onto the same double spread. For this reason the defaults used here do not produce strings containing the word "facing" or "opposite".

```
\renewcommand\reftextfaceafter
   {on the next page}
\renewcommand\reftextfacebefore
   {on the \reftextvario{previous}
                  {preceding} page}
\renewcommand\reftextafter
   {on the \reftextvario{next}
                  {following} page}
\renewcommand\reftextbefore
   {on the \reftextvario{previous
               page}{page before}}
\renewcommand\reftextcurrent
   {on \reftextvario{this}
               {the current} page}
```

Normally, text for references which are "far away" are produced using `\reftextfaraway` in `varioref`. However, to produce textual references without referring to actual page numbers even in this case, this command was hijacked in the `aipproc` class and redefined to determine whether or not this is a reference to some earlier or later page. So instead of changing this command the class provides the following two commands for customization:

```
\renewcommand\reftextearlier
   {\reftextvario{on an earlier
                page}{earlier on}}
\renewcommand\reftextlater
   {\reftextvario{later on}
                  {further down}}
```

To illustrate the result of this package all references in this document are made using `\vref` or `\vpageref`, e.g., references to Figure 2 further down and Figure 1 on the following page. These commands work best if used only for important references. Be careful when using them several times close to each other as the automatically generated texts then may sound strange (as they do in the example in this paragraph).

## Lists

The `aipproc` class supports all standard list environments like `itemize`, `enumerate`, etc.

## Graphics support

Support for including and manipulating graphics is provided as the standard LaTeX `graphicx` package is automatically loaded by the `aipproc` class. For detailed descriptions of the commands made available by this package see (3) or the package documentation coming with the LaTeX release. A sufficient introduction is also given by (4) although there only the `graphics` package (a subset of the `graphicx` package) is described.

A typical application is given in the following example where a picture is resized to span 70% of one column:

```
\begin{figure}[!b]
 \resizebox{.7\columnwidth}{!}
  {\includegraphics{escher}}
 \source{Guy Shaw}
 \caption{An illustration taken
          from~\cite{A-W:GMS94}}
 \label{fig:a}
\end{figure}
```

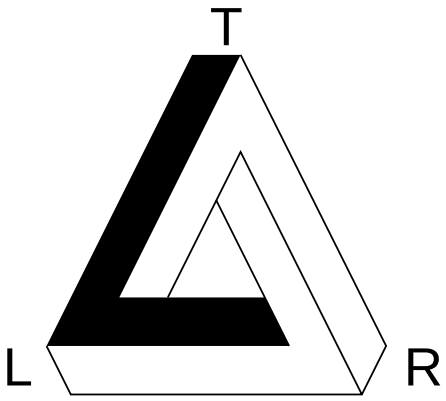
resulting in figure 1.

## Floats

Floats are objects which do not have to stay in sync with the running text but are allowed to move from their original place to some other position where they fit better for page breaking reasons. Such objects they are typically numbered so that they can be referenced from within the running text.

LaTeX by default supports two float types: figures and tables. These float types are also supported by the `aipproc` class although their internal implementation is quite different resulting in a number of important differences in behaviour:[2]

- The position of the float caption is determined automatically, independently of the placement of the `\caption` command within the float body.




*Source: Guy Shaw*

**FIGURE 1.** An illustration taken from (2)

[2] There exist packages that extend the number of float types. (This information is given as a footnote to show that footnotes in this class come out below a bottom float.)

- Depending on its width the float automatically spans two columns. In case of a table the whole object (including its caption) might even be rotated automatically if its exceeds `\textwidth`.
- The body of the float environments are processed in L-R mode and not in paragraph mode as in standard LaTeX. This is necessary for measuring its width. Thus if paragraph mode is needed one has to put a `minipage` environment of the appropriate width (e.g., `\columnwidth`) into the body.
- Only one `\caption` command per float is allowed.

### *Figures*

`\begin{figure}[`*pos*`]`

Like with standard LaTeX the optional *pos* argument can be used to specify into which float areas this float is allowed to migrate (default is `tbp`).

The environment `figure*` is not supported as figures that need to span both columns are automatically recognized.

`\source{`*text*`}`

Command to specify the origin of the picture shown. The *text* will be printed in small italics below the illustration.

A typical example of a figure float would be

```
\begin{figure}
 \resizebox{.8\textwidth}{!}
           {\includegraphics{outline}}
 \caption{PostScript example taken
          from~\cite{A-W:GMS94}}
 \label{fig:b}
 \source{F. Mittelbach}
\end{figure}
```

The result is shown in Figure 2 on the following page.

### *Tables*

`\begin{table}[`*pos*`]`

Like with standard LaTeX the optional *pos* argument can be used to specify into which float areas this float is allowed to migrate (default is `tbp`).

The environment `table*` is not supported as tables that need to span both columns are automatically recognized.

Typically the body of the environment would consist of a `tabular` environment responsible for producing the actual table including the table and stub headers.


*Source: F. Mittelbach*

**FIGURE 2.** PostScript example taken from (2)

`\tablehead{`*cols*`}{`*h-pos*`}{`*v-pos*`}{`*heading text*`}`

To ease the production of tables the command `\tablehead` is provided which is essentially and abbreviation for a `\multicolumn` command that additionally boldens its text argument. I.e., *cols* specifies the number of columns the *heading text* should span and *h-pos* defines the horizontal positioning of the text of the column(s), e.g., `l`, `r`, `c`, or `p{...}`. In contrast to a simple `\multicolumn` command the *heading text* can be split vertically by using `\\` to denote the line breaks. The *v-pos* argument should contain either `t`, `c`, or `b` denoting the vertical placement of the text in relation to other cells of that row. It is only relevant if the *heading text* consists of more than one line. See the example table below that demonstrates the use of this command.

`\source{`*text*`}`

Command to specify the origin of the data given in the table. The *text* will be printed in small italics below the table.

`\tablenote{`*text*`}`

Command to produce a note to the table. It can only be used within a `table` environment and should be used only at the right end of a table cell. The command produces a raised footnote symbol at the place used which sticks into the right margin. As far as LaTeX is concerned this symbol does not occupy any space. Thus is will not modify the alignment of table columns. The *text* will appear below the table.

In the current release notes to `\caption` or `\source` are not possible.

`\tablenote*{`*text*`}`

Like `\tablenote` but this time the raised footnote symbol will occupy space. This version is intended to be used in the middle of cells.

An example showing the use of all commands described above is shown in Table 1. It was produced by the following input:

```
\begin{table}
\begin{tabular}{lrrrr}
\hline
 &\tablehead{1}{r}{b}{Single\\outlet}
 &\tablehead{1}{r}{b}{Small\tablenote
       {2-9 retail outlets}\\multiple}
 &\tablehead{1}{r}{b}{Large\\multiple}
 &\tablehead{1}{r}{b}{Total}   \\
\hline
1982 & 98  & 129 & 620    & 847\\
1987 & 138 & 176 & 1000  & 1314\\
1991 & 173 & 248 & 1230  & 1651\\
1998\tablenote{predicted}
     & 200 & 300 & 1500  & 2000\\
\hline
\end{tabular}
\source{Central Statistical Office,
        UK}
\caption{Average turnover per shop: by
  type of retail organisation}
\label{tab:a}
\end{table}
```

**Table 1.** Average turnover per shop: by type of retail organisation

| | Single outlet | Small[a] multiple | Large multiple | Total |
|---|---|---|---|---|
| 1982 | 98 | 129 | 620 | 847 |
| 1987 | 138 | 176 | 1000 | 1314 |
| 1991 | 173 | 248 | 1230 | 1651 |
| 1998[b] | 200 | 300 | 1500 | 2000 |

*Source: Central Statistical Office, UK*

[a] 2-9 retail outlets
[b] predicted

## *Counters*

The `\alph` and `\fnsymbol` commands to represent counter values have extended ranges. For example `\alph` will now count up to 52 (zz) and the `\fnsymbol` command will produce the following symbols ∗, †, ∗∗, ‡, §, ¶, ‖, ††, ‡‡, §§, ¶¶, ∗∗∗, †††, ‡‡‡, §§§, and ¶¶¶. This

will allow for up to 16 table notes per table. For documents that need a larger number of table notes select the option `tnotealph` to switch to lower case alphabetic letters to mark such notes.

### *Long tables*

Tables which are longer than one page cannot be placed into a `table` environment as floats cannot have a size larger than a page. Such tables are supported by the standard LaTeX package `longtable` written by David Carlisle. However this package only works in single column mode. For this reason the following steps must be carried out to add such tables to the document:

1. Place an `\usepackage{longtable}` declaration into the preamble of the document.
2. At the end of the article before `\end{document}` add the command `\onecolumn` followed by an arbitrary number of `longtable` environments.

The package is supported by the class in the sense that captions within a `longtable` environment will be formatted using the appropriate style; however in contrast to the `table` environment it is the responsibility of the user to place the caption at the top of the table. The commands `\source` and `\tablenote` are not supported within this environment, but the `\tablehead` command can be used to produce column heads if desired.

Refer to the `longtable` package documentation or to (4, p.122ff) for a detailed description of the syntax of the `longtable` environment.

A possible alternative is the package `supertabular` written by Johannes Braams; however in this case no attempt has been made to ensure that a table produced with `supertabluar` conforms to the layout specification for the `aipproc` class. Be aware that this package defines its own `\tablehead` command (with a completely different function).

Refer to the package documentation for the syntax description. A detailed comparison between `supertabular` and `longtable` can be found in Chapter 5 of (4).

### *Building floats manually*

The original LaTeX environments `figure` and `table` as well as their star forms are still available under the names `ltxfigure` and `ltxtable`. They should not be used in normal circumstances but are provided in case the automatism of the `aipproc` class needs overwriting.

Please note that if these environments are used the position of the `\caption` command determines the placement of the caption within the float body and that the special commands for figures and tables, e.g., `\tablenote`, etc. as provided by this class are not available within these environments.

## Bibliography

Referring to other articles, books, etc. is done using the `\cite` command of standard LaTeX. The list of references itself can either be produced using standard LaTeX methods or using BibTeX.

### *Bibliography produced manually*

`\begin{thebibliography}{`*widest-label*`}`

Environment to hold the list of references.

`\bibitem{`*label*`}`

Command to start a bibliographical entry having the label *label* for use in `\cite` commands. Refer to (1) for information on how to lay out individual entries.

### *Bibliography produced using* BibTeX

The `aipproc` class is accompanied by a BibTeXstyle file which can be used to produce AIP compliant reference lists from BibTeXdatabase files. To use BibTeX one first has to run the source file through LaTeX the run BibTeX and then rerun LaTeX twice to get all references resolved. BibTeX is described in more detail in appendix B of (4) and in chapter 13 of (2).

`\bibliographystyle{aipproc}`

This declaration specifies to BibTeX that the style `aipproc` should be used. It can be placed anywhere within the document but is usually positioned directly in front of the command described below.

`\bibliography{`*bib-list*`}`

This command denotes the position where the reference list produced by BibTeX will be included in the document. The *bib-list* is a comma separated list of BibTeX database files.

**Table 2.** Files used by the `aipproc` class

| File | Date | Version | Description |
|---|---|---|---|
| aipproc.cls | 1998/08/21 | v0.9a | AIP Proceedings (FMi) |
| calc.sty | 1997/11/11 | v4.0e | Infix arithmetic (KKT,FJ) |
| graphicx.sty | 1997/06/09 | v1.0d | Enhanced LaTeX Graphics (DPC,SPQR) |
| keyval.sty | 1997/11/10 | v1.10 | key=value parser (DPC) |
| graphics.sty | 1997/09/09 | v1.0f | Standard LaTeX Graphics (DPC,SPQR) |
| trig.sty | 1994/10/16 | v1.08 | sin cos tan (DPC) |
| dvips.def | 1997/09/09 | v3.0e | Driver-dependant file (DPC,SPQR) |
| article.cls | 1998/05/05 | v1.3y | Standard LaTeX document class |
| size10.clo | 1998/05/05 | v1.3y | Standard LaTeX file (size option) |
| mathptm.sty | 1998/01/07 | PSNFSS v.7 | Times + math package from fontinst : S Rahtz |
| fontenc.sty | 1998/06/12 | v1.9p | Standard LaTeX package |
| t1enc.def | 1998/06/12 | v1.9p | Standard LaTeX file |
| times.sty | 1998/01/07 | PSNFSS v.7 | Times font as default roman : S Rahtz |
| textcomp.sty | 1998/06/12 | v1.9p | Standard LaTeX package |
| ts1enc.def | 1998/06/12 | v3.0d | (jk/car/fm) Standard LaTeX file |
| varioref.sty | 1997/12/06 | v1.1d | package for extended references (FMi) |
| fix2col.sty | 1998/08/17 | v0.03 | Output Routine fixes for two column mode (DPC,FMi) |
| shortvrb.sty | 1998/05/19 | v2.0b | Standard LaTeX documentation package (FMi) |
| ts1cmr.fd | 1998/03/27 | v2.5g | Standard LaTeX font definitions |
| t1ptm.fd | 1997/09/30 | Fontinst v1.6 | font definitions for T1/ptm. |
| t1pcr.fd | 1997/09/30 | Fontinst v1.6 | font definitions for T1/pcr. |
| ot1ptmcm.fd | 1997/09/30 | Fontinst v1.6 | font definitions for OT1/ptmcm. |
| omlptmcm.fd | 1997/09/30 | Fontinst v1.6 | font definitions for OML/ptmcm. |
| omspzccm.fd | 1997/09/30 | Fontinst v1.6 | font definitions for OMS/pzccm. |
| omxpsycm.fd | 1997/09/30 | Fontinst v1.6 | font definitions for OMX/psycm. |
| ot1ptm.fd | 1997/09/30 | Fontinst v1.6 | font definitions for OT1/ptm. |
| ts1ptm.fd | 1997/09/30 | Fontinst v1.6 | font definitions for TS1/ptm. |

*Source: Output of* `\listfiles` *when processing* `aipguide.tex`

## GENERAL REQUIREMENTS AND RESTRICTIONS

This class was designed to work with LaTeX 2ε release 1997/12/01 or a later version. Earlier releases may work but have not been tested.

With the exception of the package `fix2col` it only requires files which are part of a standard LaTeX distribution, i.e., it should work if your installation contains the following components: `base`, `tools`, `graphics`, and `psnfss`, see 2 for files used to produce this document.

The most recent LaTeX distribution as well as `fix2col` can be obtained from CTAN sites (Comprehensive TeX Archive Network).

Refer to `http://www.tug.org` for more information on CTAN and TeX in general.

A ready to run TeX system for various platforms which has everything required is available on CD-ROM, look into `http://www.tug.org/texlive.html`.

## REFERENCES


1. American Institute of Physics, *Conference Proceedings: Instructions for Camera Ready Manuscripts*, May 1998.
2. Goossens, M., Mittelbach, F., and Samarin, A., *The LaTeX Companion*, Reading, Massachusetts: Addison-Wesley, 1994.
3. Goossens, M., Rahtz, S., and Mittelbach, F., *The LaTeX Graphics Companion*, Tools and Techniques for Computer Typesetting, Reading, Massachusetts: Addison-Wesley, 1997.
4. Lamport, L., *LaTeX: A Document Preparation System*, second edn., Reading, Massachusetts: Addison-Wesley, 1994.