



## Bulletin of the Astronomical Society of India – a sample paper to illustrate various features\*

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**Abstract.** This illustrates the usage of various features of Version 2.1 of the  $\LaTeX$  class file for papers for the Bulletin of the Astronomical Society of India. The class file `basi.cls`, this sample paper and another guide are available from the BASI webpage:

<http://www.ncra.tifr.res.in/~basi/>

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### 1. Introduction

This is a sample paper, to illustrate various features of Version 2.1 of the  $\LaTeX$  class file for the Bulletin of the Astronomical Society of India. Some notes on using Times Roman fonts are given in Section 2, and details about how include figures and tables are given in Sections 3.1 and 3.2 respectively. Brief comments on mathematics are given in Section 4, and Section 5 describes how to use the NASA web-based ‘Astronomical Data System’ (ADS) to easily provide bibliographies of astronomical papers. Finally, Appendix A is an example appendix. The source `.tex` for this document can be consulted for the  $\LaTeX$  commands used.

### 2. Fonts

The `txfonts` package – which should be available in any reasonably up to date  $\LaTeX$  installation – provides Times Roman fonts with matching mathematical fonts, rather than the default  $\LaTeX$  ‘Computer Modern’ fonts. This package should be loaded with the `varg` option, i.e. using

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**Figure 1.** This is a simple figure, with one .eps file.

```
\usepackage[varg]{txfonts}
```

so that alternate versions of some lower case letters are used in mathematics (including ‘ $v$ ’, which is more distinguishable from the greek letter ‘ $\nu$ ’ than is the default version).

### 3. Figures and Tables

#### 3.1 Figures

For the inclusion of figures, the `\includegraphics` command from the `graphicx` package, which is automatically loaded by `basil.cls`, allows easy inclusion of encapsulated postscript (.eps) figures, e.g.



**Figure 1.** (continued). This is a simple figure, illustrating how to have a figure continued onto another page.

```
\begin{figure}
\centerline{\includegraphics[angle=90,width=3cm]{plot.eps}}
\caption{This is the figure caption.}
\end{figure}
```

See Fig. 1 for a simple figure.

Notes:

1. for the options provided to the `\includegraphics` command, do any rotations *before* specifying the final width;
2. for figures that continue on more than one page, use `\begin{continuedfigure} ... \end{continuedfigure}`, including a `\caption{(continued). ...}`;
3. if you want to only include part of an `.eps` plot, adjust the bounding box for the figure – either by editing the header of the `.eps` file, or explicitly specifying the bottom left and top right corners as an option to `\includegraphics` – and include the `clip=` (with no argument) as one of the options for `\includegraphics` (see Fig. 2).



**Figure 2.** This figure illustrates how specifying a bounding box and the `clip=` option then shows only part of an `.eps` file.

### 3.1.1 *Multiple plots in a figure*

For plots side-by-side in the same figure, put two `\includegraphics` commands within the `\centerline` command, possibly with `\quad` or `\qquad` to provide some horizontal spacing, Similarly multiple `\centerline` commands can be specified for multiple plots vertically (see Fig. 3).

### 3.1.2 *Narrow figures with caption to one side*

For narrow figures, it is possible to place the caption to one side of the figure, by using the `tabular` environment within the `figure` environment (see Fig. 4).

### 3.1.3 *Sideways figures*

It is possible to produce landscape oriented figures by adding `\usepackage{rotating}` in the preamble of your paper, which provide the `sidewaysfigure` environment. Then

```
\begin{sidewaysfigure}
...
\end{sidewaysfigure}
```

produces a single page sideways figure, an example of which is illustrated by Fig. 5. Note that this will probably not appear correct if you preview the `.dvi` version of a document with `xdvi` or similar viewers, as they are not able to display rotated text. However, converting the `.dvi` file to `.ps` or `.pdf` does not suffer from this limitation.



**Figure 3.** This figure illustrates how to multiple plots, both horizontally or vertically. It also shows how to rotate figures by  $\pm 90^\circ$ , keeping them aligned vertically.



**Figure 4.** This figure illustrates how to place a caption to the side of a narrow plot.



Figure 5. This figure illustrates how produce a sideways oriented figure.

**Table 1.** This is a simple example table.

number <sup>a</sup>	reciprocal <sup>b</sup>	cube <sup>b</sup>
1	1	1
2	0.5	8
3	0.333	27
4	0.25	64

Notes: (a) this illustrates a text note at the end of a table; (b) these columns use the ‘d’ specifier (using the `dcolumn` package), to align numbers by decimal place.

### 3.2 Tables

Tables should be typeset using horizontal rules at the start and end, and between the header and body of the table. For example

```

\newcolumnntype{d}[1]{D{.}{.}{#1}}
\begin{table}
  \caption{This is a simple example table.}\label{tab:simple}
  \medskip
  \begin{center}
    \begin{tabular}{cd{1.3}d{2.0}}\hline
      numbera\mathrm{a}$ & \multicolumn{1}{c}{reciprocalb\mathrm{b}$}
        & \multicolumn{1}{c}{cubeb\mathrm{b}$} \\ \hline
      1 & 1 & 1 \\
      2 & 0.5 & 8 \\
      3 & 0.333 & 27 \\
      4 & 0.25 & 64 \\ \hline
    \end{tabular}\\[5pt]
    \begin{minipage}{7cm}
      \small Notes: (a) this illustrates a text note at the end of
      a table; (b) these columns use the ‘\texttt{d}’ specifier
      (using the \texttt{dcolumn} package), to align numbers by
      decimal place.
    \end{minipage}
  \end{center}
\end{table}

```

produces Table 1, which also illustrates how to align numerical columns using the `dcolumn` package.

### 3.2.1 Sideways tables

As noted in Section 3.1.3, the `rotating` package provides `sidewaysfigure` environment. Similarly it also provides a `sidewaystable` environment which is suitable for single page, sideways tables.

### 3.2.2 Multi-page tables

Long, multi-page tables can be produced using various standard  $\LaTeX$  packages. In particular, see either the `supertabular` or `longtable` packages<sup>1</sup>.

## 4. Mathematics

Mathematics in text can be produced either within `\( ... \)` or `\$ ... \$`. Un-numbered displayed equations should be produced by either within `\[ ... \]` or `\$\$ ... \$\$`, and numbered displayed equations can be produced by using the `equation` environment, for example

```
\begin{equation}
  a^2 = b^2 + c^2 \label{e:example}
\end{equation}
```

produces

$$a^2 = b^2 + c^2 \tag{1}$$

which can be referred to as Eqn. 1, but using ‘Eqn.~\ref{e:example}’.

Note that with the `txfonts` package loaded, in maths mode, upright lower-case greek letters are available, in addition to the usual slanted versions. For example, you can use `\muup` for  $\mu$ .

## 5. References – using ADS

As noted in the `basiguide` document, standard  $\LaTeX$  commands are used for the bibliography. One way of doing this is to enter the appropriate `\bibitem` entries in the `bibliography` environment at the end of your paper manually. An alternate approach, which is probably more efficient and less prone to mistakes, is to use the NASA Astronomical Data System (ADS)<sup>2</sup> –

<sup>1</sup>See, for example, <http://www.ctan.org/pkg>

<sup>2</sup>See <http://www.adsabs.harvard.edu/>, or one of its mirrors.

which is a large, freely available web-based database of astronomical literature – to generate the `\bibitem` entries for you. For standard journal references, the returned text is likely to be largely usable as it is, but for proceedings or books some further editing will be needed.

First, start your `.tex` file using

```
\documentclass[usenatbib]{basi}
```

to load the `natbib` package, and set appropriate options for BASI style references.

Second, collect the ADS ‘bibcodes’ for the papers you wish to cite. You can manually collect the bibcodes in a text file, one per line, and then paste them in the box at the end of the ADS astronomical journal/volume/page search page<sup>3</sup>, and press ‘Send Query’. Or sign up for an account on the ADS system, and collect the papers you wish to cite in a ‘private library’.

Third, when all the selected papers are being displayed in ADS, press the ‘Select All Records’ button, choose to return ‘Custom format’ (which is the *last* choice in the list), and sort by ‘first author name’. Either email the results to yourself, or display them on the screen, from where you can paste the results into your document. In the ‘Custom format:’ box specify a format of

```
%z132 \bibitem[%2m%(y)%3m]{R}\n %8.1g,%Y,%q,%V,%p
```

Fourth, check and edit the returned `\bibitem` text. Add in any entries for publications not in ADS, and for the text returned by ADS: (i) edit in further details for proceedings or books, or other non-journal references; (ii) the order of papers with the same authors may need to be changed to be in the correct chronological order; and (iii) papers by the same authors in the same year will need to have additional ‘a’, ‘b’, etc. added to their years to distinguish between them. (Note: for three author papers, ADS will return an author list with a ‘serial’ comma after the second author and before the `\&`, but this will be removed automatically if you specify the `usenatbib` option at the beginning of your document.)

Fifth, include the `\bibitem` text at the end of your `.tex` file, between

```
\begin{thebibliography}{}

```

(note the dummy, empty argument *is* needed) and

```
\end{thebibliography}
```

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<sup>3</sup>At [http://adsabs.harvard.edu/bib\\_abs.html](http://adsabs.harvard.edu/bib_abs.html)

In the main body of your paper you can then use the standard commands from the `natbib` package to cite papers<sup>4</sup>. Some simple examples include:

- `\citet{...}` for references in the text, e.g.

```
\citet{2003BASI...31...19P, 2004BASI...32..159R,
      2009BASI...37...63S}
```

gives Pandey et al. (2003); Rautela, Joshi & Pandey (2004); Saikia & Jamrozy (2009);

- `\citep{...}` for references in parentheses, e.g.

```
\citep{2001BASI...29..169H, 2004BASI...32..151S,
      2009BASI...37...63S}
```

gives (Hiremath 2001; Sujatha et al. 2004; Saikia & Jamrozy 2009).

The `natbib` package is loaded with the `longnamesfirst` option, so three author papers are cited by all three names the first time (see example above), but subsequently by first author plus ‘et al.’, e.g. Rautela et al. (2004) is a second citation of a three author paper.

## Acknowledgements

Here is where acknowledgements go, in an un-numbered section (which is specified by using the `\section*{Acknowledgements}` command).

## References

Hiremath K. M., 2001, BASI, 29, 169  
 Pandey S. B., et al., 2003, BASI, 31, 19  
 Rautela B. S., Joshi G. C., Pandey J. C., 2004, BASI, 32, 159  
 Saikia D. J., Jamrozy M., 2009, BASI, 37, 63  
 Sujatha N. V., Chakraborty P., Murthy J., Henry R. C., 2004, BASI, 32, 151

## A. An Example Appendix

This is an example appendix, which uses the `\appendix` command, and then subsequently the `\section{...}`, `\subsection{...}` etc. commands.

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<sup>4</sup>See, for example, `natnotes.pdf` at <http://www.ctan.org/tex-archive/macros/latex/contrib/natbib/> for a summary listing of the available commands.