Differences between REVTeX 4 and REVTeX 3

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Contents

1. INTRODUCTION

This document gives a brief summary of how REVTeX 4 is different from what authors may already be familiar with. The two primary design goals for REVTeX 4 are to 1) move to LaTeX 2_ε and 2) improve the markup so that infomation can be more reliably extracted for the editorial and production processes. Both of these goals require that authors comfortable with earlier versions of REVTeX change their habits. In addition, authors may already be familiar with the standard `article.cls` in LaTeX 2_ε. REVTeX 4 differs in some important ways from this class as well. For more complete documentation on REVTeX 4, see the main *REVTeX 4 Author's Guide*. The most important changes are in the markup of the front matter (title, authors, affiliations, abstract, etc.). Please see Sec. 5.

2. VERSION OF LaTeX

The most obvious difference between REVTeX 4 and REVTeX 3 is that REVTeX 4 works solely with LaTeX 2_ε; it is not useable as a LaTeX2.09 package. Furthermore, REVTeX 4 requires an up-to-date LaTeX installation (1996/06/01 or later); its use under older versions is not supported.

3. CLASS OPTIONS AND DEFAULTS

Many of the class options in REVTeX 3 have been retained in REVTeX 4. However, the default behavior for these options can be different than in REVTeX 3. Currently, there is only one society option, `aps`, and this is the default. Furthermore, the selection of a journal (such as `prl`) will automatically set the society as well (this will be true even after other societies are added).

In REVTeX 3, it was necessary to invoke the `floats`, but this is the default for `aps` journal in REVTeX 4. REVTeX 4 introduces two new class options, `endfloats` and `endfloats*` for moving floats to the end of the paper.

The preamble commands `\draft` and `\tighten` have been replaced with new class options `draft` and `tightenlines`, respectively. The `\preprint` command is now used only for specifying institutional report numbers (typeset in the upper-righthand corner of the first page); it no longer influences whether PACS numbers are displayed below the abstract. PACS display is controlled by the `showpacs` and `noshowpacs` (default) class options.

Paper size options (`letter`, `a4paper`, etc.) work in REVTeX 4. The text "Typeset by REVTeX" no longer appears by default - the option `byrevtex` will place this text in the lower-lefthand corner of the first page.

4. ONE- AND TWO-COLUMN FORMATTING

REVTeX 4 has excellent support for achieving the two-column formatting in the *Physical Review* and *Reviews of Modern Physics* styles. It will balance the columns automatically. Whereas REVTeX 3 had the

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\widetext and \narrowtext commands for switching between one- and two-cloumn modes, REVTEX 4 simply has a widetext environment, \begin{widetext} ... \end{widetext}. One-column formatting can be specified by choosing either the onecolumn or preprint class option (the REVTEX 3 option manuscript no longer exists). Two-column formatting is the default for most journal styles, but can be specified with the twocolumn option. Note that the spacing for preprint is now set to 1.5, rather than full double-spacing. The tightenlines option can be used to reduce this to single spacing.

5. FRONT MATTER MARKUP

REVTEX 4 has substantially changed how the front matter for an article is marked up. These are the most significant differences between REVTEX 4 and other systems for typesetting manuscripts. It is essential that authors new to REVTEX 4 be familiar with these changes.

5.1. Authors, Affiliations, and Author Notes

REVTEX 4 has substantially changed the markup of author names, affiliations, and author notes (footnotes giving additional information about the author such as a permanent address or an email address).

- Each author name should appear separately in individual \author macros.
- Email addresses should be marked up using the \email macro.
- Alternative affiliation information should be marked up using the \altaffiliation macro.
- URLs for author home pages can be specified with a \homepage macro.
- The \thanks macro should only be used if one of the above don't apply.
- \email, \homepage, \altaffiliation, and \thanks commands are grouped together under a single footnote for each author. These footnotes can either appear at the bottom of the first page of the article or as the first entries in the bibliography. The journal style controls this placement, but it may be overridden by using the class options bibnotes and nobibnotes. Note that these footnotes are treated differently than the other footnotes in the article.
- The grouping of authors by affiliations is accomplished automatically. Each affiliation should be in its own \affiliation command. Multiple \affiliation, \email, \homepage, \altaffiliation, and \thanks commands can be applied to each author. The macro \and has been eliminated.
- \affiliation commmands apply to all previous authors that don't have an affiliation already declared. Furthermore, for any particular author, the \affilation must follow any \email, \homepage, \altaffiliation, or \thanks commands for that author.
- Footnote-style associations of authors with affilitations should not be done via explicit superscripts; rather, the class option superscriptaddress should be used to accomplish this automatically.
- A collaboration for a group of authors can be given using the \collaboration command.

Table I summarizes some common pitfalls in moving from REVTEX 3 to REVTEX 4.

5.2. Abstracts

REVTEX 4, like REVTEX 3, uses the abstract environment \begin{abstract} ... \end{abstract} for the abstract. The abstract environment must appear before the \maketitle command in REVTEX 4. The abstract will be formatted appropriately for either one-column (preprint) or two-column formatting. In particular, in the two-column case, the abstract will automatically be placed in a single column that spans the width of the page. It is unnecessary to use a \minipage or any other macro to achieve this result.

6. CITATIONS AND REFERENCES

REVTEX 4 uses the same \cite,\ref, and \bibitem commmands as standard LATEX and REVTEX 3. Citation handling is based upon Patick Daly's natbib package. The references environment is no longer used. Instead, use the standard LATEX 2_ε environment thebibliography.

Two new BIBTEX files have been included with REVTEX 4, apsrev.bst and apsrmp.bst. These will format references in the style of *Physical Review* and *Reviews of Modern Physics* respectively. In addition, these BIBTEX styles automatically apply a special macro \bibinfo to each element of the bibliography to make it easier to extract information for use in the editorial and production processes. Authors are strongly urged to use BIBTEX to manage their bibliographies so that the \bibinfo directives will be automatically included. Other bibliography styles can be specified by using the \bibliographystyle command, but unlike stan-

REVTEX 3 Markup	REVTEX 4 Markup	Explanation
`\author{Author One and Author Two}`	`\author{Author One}` `\author{Author Two}`	One name per `\author`

`\author{Author One$^{1}$}`
...
`\address{$^{1}$APS}`
	`\author{Author One}`
	...
	`\affiliation{APS}`
		Use `superscriptaddress` class option

`\thanks{Permanent address...}`
`\thanks{Electronic address: user@domain.edu}`
`\thanks{http://publish.aps.org/}`
	`\altaffiliation{}`
	`\email{user@domain.edu}`
	`\homepage{http://publish.aps.org/}`
		Use most specific macro available

TABLE I: Common mistakes in marking up the front matter

dard LATEX 2_ε, you must give this command *before* the `\begin{document}` statement.

Please note that the package `cite.sty` is not needed with REVTEX 4 and is incompatible.

7. FOOTNOTES AND TABLENOTES

REVTEX 4 uses the standard `\footnote` macro for footnotes. Footnotes can either appear on the bottom of the page on which they occur or they can appear as entries at the end of the bibliography. As with author notes, the journal style option controls the placement; however, this can be overridden with the class options `footinbib` and `nofootinbib`.

Within a table, the `\footnote` command behaves differently. Footnotes appear at the bottom of the table. `\footnotemark` and `\footnotetext` are also available within the table environment so that multiple table entries can share the same footnote text. There is no longer a need to use a `\tablenote`, `\tablenotemark`, and `\tablenotetext` macros.

8. SECTION COMMANDS

The title in a `\section{`⟨*title*⟩`}` command will be automatically uppercased in REVTEX 4. To prevent a particular letter from being uppercased, enclose it in curly braces.

9. FIGURES

Figures should be enclosed within either a `figure` or `figure*` environment (the latter will cause the figure to span the full width of the page in two-column mode). LATEX 2_ε has two convenient packages for including the figure file itself: `graphics` and `graphicx`. These two packages both define a macro `\includegraphics` which calls in the figure. They differ in how arguments for rotation, translation, and scaling are specified. The package `epsfig` has been re-implemented to use these `graphicx` package. The package `epsfig` provides an interface similar to that under the REVTEX 3 `epsf` class option. Authors should use these standard LATEX 2_ε packages rather than some other alternative.

10. TABLES

Short tables should be enclosed within either a `table` or `table*` environmnent (the latter will cause the table to span the full width of the page in two-column mode). The heart of the table is the `tabular` environment. This will behave for the most part as in standard LATEX 2_ε. Note that REVTEX 4 no longer automatically adds double (Scotch) rules around tables. Nor does the `tabular` environment set various table parameters as before. Instead, a new environment `ruledtabular` provides this functionality. This environment should surround the `tabular` environment:

```
\begin{table}
\caption{...}
\label{tab:...}
\begin{ruledtabular}
\begin{tabular}
...
\end{tabular}
\end{ruledtabular}
\end{table}
```

Under REVTEX 3, tables automatically break across pages. REVTEX 4 provides some of this functionality. However, this requires adding the table a float placement option of [H] (meaning put the table “here”) to the `\begin{table}` command.

Long tables are more robustly handled by using the `longtable.sty` package included with the standard LaTeX 2_ε distribution (put `\usepackage{longtable}` in the preamble). This package gives precise control over the layout of the table. REVTeX 4 goes out of its way to provide patches so that the `longtable` environment will work within a two-column format. A new `longtable*` environment is also provided for long tables that are too wide for a narrow column. (Note that the `table*` and `longtable*` environments should always be used rather than attempting to use the `widetext` environment.)

To create tables with columns of numbers aligned on decimal points, load the standard LaTeX 2_ε `dcolumn` package and use the `d` column specifier. The content of each cell in the column is implicitly in math mode: Use of math delimiters (`$`) is unnecessary in a `d` column.

Footnotes within a table can be specified with the `\footnote` command (see Sec. 7).

11. FONT SELECTION

The largest difference between REVTeX 3 and REVTeX 4 with respect to fonts is that REVTeX 4 allows one use the LaTeX 2_ε font commands such as `\textit`, `\texttt`, `\textbf` etc. These commands should be used in place of the basic TeX/LaTeX 2.09 font commands such as `\it`, `\tt`, `\bf`, etc. The new font commands better handle subtleties such as italic correction and scaling in super- and subscripts.

12. MATH AND SYMBOLS

REVTeX 4 depends more heavily on packages from the standard LaTeX 2_ε distribution and AMS-LaTeX than REVTeX 3 did. Thus, REVTeX 4 users should make sure their LaTeX 2_ε distributions are up to date and they should install AMS-LaTeX 2.0 as well. In general, if any fine control of equation layout, special math symbols, or other specialized math constructs are needed, users should look to the `amsmath` package (see the AMS-LaTeX documentation).

REVTeX 4 provides a small number of additional diacritics, symbols, and bold parentheses. Table II summarizes this.

Here is a partial list of the more notable changes between REVTeX 3 and REVTeX 4 math:

- Bold math characters should now be handle via the standard LaTeX 2_ε `bm` package (use `\bm` instead of `\bbox`). `\bm` will handle Greek letters and other symbols.

- Use the class options `amsmath`, `amsfonts` and `amssymb` to get even more math fonts and symbols. `\mathfrak` and `\mathbb` will, for instance, give Fraktur and Blackboard Bold symbols.

- Use the `fleqn` class option for making equation flush left or right. `\FL` and `\FR` are no longer provided.

- In place of `\eqnum`, load the `amsmath` package [`\usepackage{amsmath}`] and use `\tag`.

- In place of `\case`, use `\textstyle\frac`.

- In place of the `mathletters` environment, load the `amsmath` package and use `subequations` environment.

- In place of `\slantfrac`, use `\frac`.

- The macros `\corresponds`, `\overdots`, and `\overcirc` have been removed. See Table III.

TABLE II: Special REVTeX 4 symbols, accents, and boldfaced parentheses defined in `revsymb.sty`

`\lambdabar`	ƛ	`\openone`	$\mathbb{1}$
`\altsuccsim`	$\succsim$	`\altprecsim`	$\precsim$
`\alt`	$\lesssim$	`\agt`	$\gtrsim$
`\tensor x`	$\overleftrightarrow{x}$	`\overstar x`	$\overset{*}{x}$
`\loarrow x`	$\overleftarrow{x}$	`\roarrow x`	$\overrightarrow{x}$
`\biglb ( \bigrb)`	$\bigl(\bigr)$	`\Biglb ( \Bigrb)`	$\Bigl(\Bigr)$
`\bigglb ( \biggrb)`	$\biggl(\biggr)$	`\Bigglb ( \Biggrb )`	$\Biggl(\Biggr)$

13. OBSOLETE REVTeX 3.1 COMMANDS

Table III summarizes more differences between REVTeX 4 and REVTeX 3, particularly which REVTeX 3 commands are now obsolete.

14. CONVERTING A REVTeX 3.1 DOCUMENT TO REVTeX 4

REVTeX 3 documents can be converted to REVTeX 4 rather straightforwardly. The following checklist covers most of the major steps involved.

- Change `\documentstyle{revtex}` to `\documentclass{revtex4}`, and run the document under LaTeX 2_ε instead of LaTeX2.09.

- Replace the `\draft` command with the `draft` class option.

- Replace the `\tighten` command with the `tightenlines` class option.

TABLE III: Differences between REVTEX 3.1 and REVTEX 4 markup

REVTEX 3.1 command	**REVTEX 4 replacement**
`\documentstyle[`⟨*options*⟩`]{revtex}`	`\documentclass[`⟨*options*⟩`]{revtex4}`
option `manuscript`	`preprint`
`\tighten` preamble command	`tightenlines` class option
`\draft` preamble command	`draft` class option
`\author`	`\author{`⟨*name*⟩`}` may appear multiple times; each signifies a new author name.
	`\collaboration{`⟨*name*⟩`}`: Collaboration name (should appear after last `\author`)
	`\homepage{`⟨*URL*⟩`}`: URL for preceding author
	`\email{`⟨*email*⟩`}`: email address for preceding author
	`\altaffiliation`: alternate affiliation for preceding `\author`
`\thanks`	`\thanks`, but use only for information not covered by `\email`, `\homepage`, or `\altaffilitiation`
`\and`	obsolete, remove this command
`\address`	`\affiliation{`⟨*institution*⟩`}` gives the affiliation for the group of authors above
	`\affiliation[`⟨*note*⟩`]` lets you specify a footnote to this institution
	`\noaffiliation` signifies that the above authors have no affiliation
`\preprint`	`\preprint{`⟨*number*⟩`}` can appear multiple times, and must precede `\maketitle`
`\pacs`	`\pacs` must precede `\maketitle`
`abstract` environment	`abstract` environment must precede `\maketitle`
`\wideabs`	obsolete, remove this command
`\maketitle`	`\maketitle` must follow *all* front matter data commands
`\narrowtext`	obsolete, remove this command
`\mediumtext`	obsolete, remove this command
`\widetext`	obsolete, replace with `widetext` environment
`\FL`	obsolete, remove this command
`\FR`	obsolete, remove this command
`\eqnum`	replace with `\tag`, load `amsmath`
`mathletters`	replace with `subequations`, load `amsmath`
`tabular` environment	No longer puts in doubled-rules. Enclose `tabular` in `ruledtabular` to get old behavior.
`quasitable` environment	obsolete, `tabular` environment no longer puts in rules
`references` environment	replace with `thebibliography{}`
`\case`	replace with `\textstyle\frac`
`\slantfrac`	replace with `\frac`
`\tablenote`	replace with `\footnote`
`\tablenotemark`	replace with `\footnotemark`
`\tablenotetext`	replace with `\footnotetext`
`\overcirc`	Use standard LaTeX 2_ε `\mathring`
`\overdots`	Use `\dddot` with `amsmath`
`\corresponds`	Use `\triangleq` with `amssymb`
`epsf` class option	`\usepackage{epsfig}`

- For each `\author` command, split the multiple authors into individual `\author` commands. Remove any instances of `\and`.
- For superscript-style associations between authors and affiliations, remove explicit superscripts and use the `superscriptaddress` class option.
- Use `\affiliation` instead of `\address`.
- Put `\maketitle` after the `abstract` environment and any `\pacs` commands.
- If double-ruled table borders are desired, enclose `tabular` enviroments in `ruledtabular` environments.
- Convert long tables to `longtable`, and load the `longtable` package. Alternatively, give the `table` an [H] float placement parameter so that the table will

break automatically.

- Replace any instances of the `\widetext` and `\narrowtext` commands with the `widetext` environment. Usually, the `\begin{widetext}` statement will replace the `\widetext` command, and the `\end{widetext}` statement replaces the matching `\narrowtext` command.

  Note in this connection that due to a curious feature of LaTeX itself, REVTeX 4 having a `widetext` environment means that it also has a definition for the `\widetext` command, even though the latter cammand is not intended to be used in your document. Therefore, it is particularly important to remove all `\widetext` commands when converting to REVTeX 4.

- Remove all obsolete commands: `\FL`, `\FR`, `\narrowtext`, and `\mediumtext` (see Table III).

- Replace `\case` with `\frac`. If a fraction needs to be set in text style despite being in a display equation, use the construction `\textstyle\frac`. Note that `\frac` does not support the syntax `\case1/2`.

- Replace `\slantfrac` with `\frac`.

- Change `\frak` to `\mathfrak{`⟨*char*⟩`}` and `\Bbb` to `\mathbb{`⟨*char*⟩`}`, and invoke one of the class options `amsfonts` or `amssymb`.

- Replace environment `mathletters` with environment `subequations` and load the `amsmath` package.

- Replace `\eqnum` with `\tag` and load the `amsmath` package.

- Replace `\bbox` with `\bm` and load the `bm` package.

- If using the `\text` command, load the `amsmath` package.

- If using the `d` column specifier in `tabular` environments, load the `dcolumn` package. Under `dcolumn`, the content of each `d` column cell is implicitly in math mode: remove any `$` math delimiters appearing in cells in a `d` column.

- Replace `\tablenote` with `\footnote`, `\tablenotemark` with `\footnotemark`, and `\tablenotetext` with `\footnotetext`.

- Replace `\begin{references}` with `\begin{thebibliography}{}`; `\end{references}` with `\end{thebibliography}`.