

1 Guidance on Producing L^AT_EX Documents

2 Instructions and Example

3 April 20, 2015

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¹ List of Figures

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1 List of Tables

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1 **Todo list**

2	Think of something critical about this sentence	14
3	run spell checker	14
4	This shows how.	14
5	Note that any acronyms list that a volume has requires an extra step to be included;	
6	this step is not documented there. The technical editors will take care of it.	16

Chapter 1

Generalities

h:generalities

This volume gives guidance to authors and editors of the CDR volumes. It collects “wisdom” learned producing earlier documents, in particular the CDR and science document, and we will appreciate very much if everyone follows it! It tries to follow its own guidance, so looking at its L^AT_EX source can provide an example.

1.1 Files

sec:files

An entire document may consist of one or more *volumes* (eg, the CDR consists of several, only some of which are written in L^AT_EX. You will find the L^AT_EX and figure content for a given volume arranged like:

NAME.tex the main file and is found in the top-level directory. It generally has no significant content itself but includes content through other chapter or other files.

figures/ top-level subdirectory for any static figures shared by more than one volume in the repository.

NAME/ subdirectory holding all content for one particular volume.

NAME/chapter-CHAPTERNAME.tex holds the content for one chapter of a volume.

NAME/figures/ subdirectory holding any static volume-specific figures

NAME/generated/ subdirectory holding any generated figures (see Section 2.2 for info on generated files)

sec:figures

1 Where `NAME` is some label for the volume (the name for the volume you are reading
 2 now is “`guidance`”). Multi-volume documents may pick some file naming convention
 3 (eg, the CDR uses “`volume-VOLUMENAME`”. Specific files hold chapter-level content
 4 and are named after some short, descriptive label. The file holding this sentence is
 5 “`guidance/chapter-general.tex`”. Some general guidance on choosing these file
 6 names:

- 7 • Editors may elect to further break up content into per-section files. If so, follow
 8 a naming convention such as “`chapter-CHAPTERNAME-section-SECTIONNAME.tex`”.
- 9 • Do not include a volume, chapter or section numbers in any file name. Their
 10 actual numbers will be determined by high-level ordering by the editors.
- 11 • The editors are expected to maintain the top level `NAME.tex` files. General
 12 authors should avoid modifying it.
- 13 • Use the `figures/` subdirectory for static figures (see Section 2.2). For how to
 14 include generated figures see Section 1.2.2. `sec:figures`
`sec:plots`
- 15 • If you find something inadequate or have questions, consult with either:
 16 Anne Heavey, `aheavey@fnal.gov`, 630-840-8039 (technical editor)
 17 Brett Viren, `bv@bnl.gov` (help on graphics, \LaTeX and git machinery)

18 1.2 Figure Format

`figure-format`
 19 It is essential to use high-quality, efficiently sized figures (aka “graphics”). You may
 20 be asked to re make any that egregiously violate some some basic standards. These
 21 standards are in place to avoid sub-optimal figures, bloated files sizes, and delayed
 22 publishing schedules. Often the best thing to do is to **not** process or attempt to
 23 optimize a graphic but provide the editors access to the most “raw” graphic which
 24 your software can produce. If at all uncertain, please contact the technical editors.
 25 The rest of this section provides guidance on how to create optimal figures.

26 1.2.1 Graphic Types

`graphic-types`
 27 There two basic graphic content types; these are important to understand:

28 **raster** a two dimensional array of pixels

29 **vector** a two dimensional drawing description language

1 The documents compile with `pdflatex` and so may use graphics in PDF, JPEG
2 or PNG file formats. These formats have specific best uses:

3 **JPEG** use for photographs

4 **PDF** use of any line drawings, plots, illustrations

5 **PNG** use due to some inability to produce proper JPEG or PDF (contact editors)

6 It is possible (though unwise) to store inherently raster information in PDF or
7 to rasterize inherently vector information into JPEG or PNG. **This is the main**
8 **cause for bloated, low-quality graphics.** Here are some guidelines addressing
9 this common problem:

- 10 • Only save photographic images to JPEG, avoid re-saves.
- 11 • Save line drawings, plots or illustrations directly to vector PDF.
- 12 • Follow special guidance on annotation (see Section [1.2.3](#)).^{sec:annotate}
- 13 • Never convert any raster data (JPEG/PNG) to PDF.
- 14 • Never raster what is really vector data in to a JPEG/PNG.
- 15 • Never use Microsoft PowerPoint for any figure as it tends to lead to poor
16 quality and bloated files.
- 17 • Do save using native application formats to allow later modification
- 18 • Leave any potential format conversions to the technical editors.
- 19 • Consider providing plots as easy-to-reproduce ROOT, Python or other scripts.
20 (see Section [1.2.2](#)).^{sec:plots}

21 If authors find these guidelines can not be followed for any given graphic, please
22 contact the technical editors.

23 **1.2.2 Plots**

24 Where possible, it is recommended that any plots be submitted in a form that allows
25 easy reproduction from data in the course of building the document. This allows the
26 technical editors to attempt to apply consistent in-plot fonts, colors, wording. (More
27 info to be added.)

1.2.3 Annotated Figures

sec:annotate

1
2 One common figure type is to take a figure and annotate it with arrows, labels, etc.
3 Ideally you will do this directly in LaTeX, for example using TikZ. If you can't do
4 that, then take care not to produce a bloated, low-quality graphic, and please choose
5 fonts and colors that "work" with the document. If at all possible, provide the file
6 in a format which can be further edited and which does not turn raster data into
7 PDF nor vector data into JPEG/PNG. If this can't be avoided and if the underlying
8 graphic is JPEG then produce the final version in JPEG and not PNG nor PDF. If
9 the annotation is on top of an original vector drawing and your annotation software
10 will retain the vector information, save it as PDF.

1 Chapter 2

2 Writing L^AT_EX

3 This is the start of a chapter and gives some introduction before its first section.

4 This chapter describes basic L^AT_EX you need to know.

5 2.1 Sectioning

sec:sectioning

6 The following sectioning macros are available, ordered in descending importance:

7 `\chapter{A Chapter}`

8 `\section{A Section}`

9 `\subsection{A Sub Section}`

10 `\subsubsection{A Sub Sub Section}`

11 `\subsubsubsection{A Sub Sub Sub Section}`

12 Three-sub's is all you get. Consult with the technical editors if you feel finer
13 grained sectioning is required. Starting from `\subsection`, this produces the follow-
14 ing:

15 2.1.1 A Sub Section

16 This is a subsection.

17 A Sub Sub Section

18 This is a subsubsection.

1 A Sub Sub Sub Section

2 This is a subsubsubsection and is getting to be a bit too fine-grained. It will not
3 appear in the table of contents, which will show entries as low as subsubsection only.

4 2.1.2 Section Labels

5 Just after defining a chapter and any significant section a `\label` should be added
6 so it can be referenced. A label can be added later for a “less significant” section
7 that turns out to need one. You can label them all.

8 For example:

```
9 \chapter{A Chapter}
10 \label{ch:a-chapter}
11
12 \section{A Section}
13 \label{sec:a-section}
14
15 \subsection{A Sub Section}
16 \label{subsec:a-subsection}
```

17 See Section [2.4](#) for how to reference labeled sections.

18 2.2 Figures

`sec:figures`

19 See Section [1.2](#) for guidelines on the graphics files themselves. Instead of using
20 the usual `figure` environment a custom `cdrfigure` environment is used in order to
21 provide for a consistent presentation. The environment is called with one optional
22 and two required arguments:

- 23 1. An initial, optional short caption for the List Of Figures, in square brackets.
- 24 2. A label for referencing (it will have `fig:` prepended). Curly brackets.
- 25 3. The full caption. Curly brackets, again.

26 This is followed by including the graphic file.

27 When the figure contains a graphic, usually `includegraphics` is used. The file-
28 name is assumed relative to a volume-specific `graphicspath` as described in Sec-
29 tion [1.1](#) and as such one typically should **not** specify any directory parts in its name.



Figure 2.1: An aerial photograph of Fermilab showing Wilson Hall and surrounding accelerator rings (Fermilab Visual Media Services)

fig:aerial

```
\begin{cdrfigure}[Short ToF caption.]{aerial}{An aerial photograph of Fermilab
    showing Wilson Hall and surrounding accelerator rings (Fermilab
    Visual Media Services)}
    \includegraphics[width=0.8\textwidth]{fermilab-aerial.jpg}
\end{cdrfigure}
```

Figure 2.2: \LaTeX showing how to do include a figure.

fig:aerial-lat

- 1 The file's extension may be omitted. An example can be seen in Figure 2.1, which
- 2 is created with the following \LaTeX shown in Figure 2.2

2.3 Tables

sec:tables

Like figures, we use a special environment, `cdrtable` for tables to achieve a degree of consistency. This is instead of the usual double `table` + `tabular` environments. The `cdrtable` environment takes one optional and three required arguments:

1. An initial, optional short caption for the List of Tables. Square brackets.
2. The tabular column specification. Curly brackets for the last three.
3. A label for referencing (it will have `tab:` appended)
4. The full caption.

Inside the actual contents of the table you are required to provide a initial row containing the headings for the table's rows followed by a `toprowrule` macro. Following every regular row (except the last) you should include a `colline` macro. Both of these take the place of the usual `hline`.

Table 2.1: This is an example table. We will use better colors, don't worry.

Rows	Counts
Row 1	First
Row 2	Second
Row 3	Third

tab:example

Table 2.1 is thus made like (arguments can span lines):

```

\begin{cdrtable}[The LoT caption]{cc}{example}
{This is an example table. We will use better colors, don't worry.}
  Rows & Counts \\ \toprowrule
  Row 1 & First \\ \colhline
  Row 2 & Second \\ \colhline
  Row 3 & Third \\
\end{cdrtable}

```

Table 2.2 shows a more complex example. See the source for how it is written. Note that special column specifications are used.

Table 2.2: Efficiencies and background rates for nucleon decay channels of interest for a large underground LArTPC, and comparison with water Cherenkov detector capabilities

Decay Mode	Water Cherenkov		Liquid Argon TPC	
	Efficiency	Background	Efficiency	Background
$p \rightarrow K^+ \bar{\nu}$	19%	4	97%	1
$p \rightarrow K^0 \mu^+$	10%	8	47%	< 2
$p \rightarrow K^+ \mu^- \pi^+$			97%	1
$n \rightarrow K^+ e^-$	10%	3	96%	< 2
$n \rightarrow e^+ \pi^-$	19%	2	44%	0.8

tab:pdecay

2.4 Referencing and Citations

sec:refs

Note: if you see a grey label box containing `sec:refs` between this paragraph and the section heading (or in general elsewhere in chapters, sections, figures, etc), it means this document was built in draft mode. These artifacts show up to help you know what label was used to reference each particular thing.

2.4.1 Intra-document References

Assume that any chapter, section or important sub-, subsub-, section or within any figure or table environment may need to be referenced elsewhere in the text. As described in Section 2.1, define a label (`\label{...}`) for these items. Use the defined label in a `\ref{...}` in order to make reference to the chapter, section, figure, etc. For example:

```

\chapter{Some Chapter}
\label{ch:some-chapter}

\subsection{Some Sub Section}
\label{subsec:some-sub-section}

...

As described in Chapter~\ref{ch:some-chapter} ...

As shown in Figure~\ref{fig:fermilab-aerial} ...

```

1 When you reference a chapter, section, subsection, figure, table, etc., capitalize
2 the word “Chapter” or whatever it is, e.g., “as shown in Section 1.2.2.” Use the word
3 “Section” even if it’s a subsection or subsubsection, and use the tilde sign to keep
4 the number on the same line as the word that precedes it.

5 Examples for figures and tables have been given above. Here I reference this
6 section: 2.4.

7 2.4.2 Citations

8 Referencing citations is done like `\cite{strunk}` which gives [1]. (Compiling the
9 bibliography entries into the document requires an extra step: run “bibtex” on guid-
10 ance.tex, then run `pdflatex` on it again a couple of times. Otherwise you’ll see [?]
11 here and no bibliography entry at the end.) The key `strunk` matches an entry in
12 the `common/citedb.bib` file (as relative to the top-level directory).

13 The `citedb.bib` file is in BibTeX format. This is **not** L^AT_EX format and in
14 particular does not indicate comments via `%` characters. The content and order of
15 entries in this file is not reflected in the generated Bibliography. However, manual
16 care must be taken to avoid duplication. Before adding any entry to `citedb.bib`
17 read/search through it to ascertain that the entry you wish to add is not already
18 there.

19 2.5 Common Names

20 To enforce consistency, use a L^AT_EX macro in place of any name or term which is
21 frequently used. It is especially important to do this if the name or term is subject
22 to multiple “spellings”. The file `common/defs.tex` is where all such macros should
23 be defined.

24 Some examples:

25 • δm_{21}^2 is written as `\dm{21}`.

26 • Sanford Underground Research Facility is written as `\SURF`.

27 2.6 Numbers and Units

28 **All** numerical quantities expressed as literal number **must** have units unless they are
29 inherently do not have a unit. In order to enforce consistency the `siunitx` package
30 is used and a collection of common units are defined in `common/units.tex`.

1 **2.6.1 Bare Numbers**

2 To enforce consistent writing of numbers encase them in the `\num{}` command:

- 3 • “100” is written as `\num{100}`.
- 4 • “1,000” is written as `\num{1000}`.
- 5 • “123.456” is written as `\num{123.456}`.

6 **2.6.2 Bare Units**

7 If you need to write a bare unit, one with not associated number, use `\si{}` (lower
8 case “si”)

- 9 • “m” is written `\si{m}`.
- 10 • “pc” is written `\si{pc}`.

11 **2.6.3 Numbers and Units**

12 When a quantity has a unit write both the numerical part and the unit using the
13 `\SI{ }{ }` command like:

- 14 • “120 GeV” is written as `\SI{120}{GeV}`.
- 15 • “4,850 foot” is written as `\SI{4850}{foot}`

16 **2.6.4 Adjective Quantities**

17 Some language uses quantities as adjectives. These require proper outfitting with a
18 dash which is easy to forget. To accommodate this a set of “adjective quantities”
19 commands are defined. A generic `\SIadj` is provided as are some commonly used
20 ones. For example:

- 21 • “The 4,850-ft level” is written as The `\SIadj{4850}{ft}` level.
- 22 • “The 4,850-ft level” is written as The `\ftadj{4850}` level.
- 23 • “A typical 2-GeV event” is written as A typical `\GeVadj{2}` event.
- 24 •

1 **2.6.5 Common compound units**

2 There are some common units that rather long to type out each time especially when
3 we require nice formatting.

- 4 • “per m · sr” is written as `per \msr`
- 5 • “exposure in kt · MW · years” is written as `exposure in \ktmwyr{s}`

1 Chapter 3

2 Reviewing and Editing

3 3.1 Markup

4 While reviewing, it is possible to mark up the document with simple L^AT_EX macros
5 as provided by the “todonotes” class. This class has many features but a few are
6 more important.

7 Note: if you do not see the examples in this section your copy may have been
8 built with the “final” option turned on.

9 3.1.1 Inline Fixme

10 You may prefer to place an inline note to mark up the text. This can be accomplished
11 with a

12 Think of something critical about this sentence

13 `\fixme{...}` command.

14 3.1.2 Margin notes

15 You can add notes to the margine easily which are associated with some text using:

16 `\todo{run spell checker.}`

run spell
checker

17 3.1.3 Highlighting

18 If you wish to make add a comment on some section of text you may highlight it with
19 a comment.

This
shows
how.

```
1 \hlfix{highlight it}{This shows how.}
```

1 Chapter 4

2 Technical

3 This chapter describes some of the more technical aspects of the CDR.

4 4.1 Getting the Files and Compiling after your Changes

5 Detailed instructions for getting the files and compiling a volume are given on main
6 GitHub page for the repository supplying this document at [https://github.com/
7 DUNE/document-guidance](https://github.com/DUNE/document-guidance).

8 Note that any acronyms list that a volume has requires an extra step to be included; this step is not documented there. The technical editors will take care of it.

9 4.2 The \LaTeX CDR class

10 All of the \LaTeX configuration for the document that pertains to the general “CDR”
11 style is in the `cdr.cls` file. The class takes some options that control high-level style:

12 **final** this removes all extra markup useful during editing phase.

13 4.3 Volume-generic \LaTeX files

14 Multi-volume documents are supported and should use the `common/` subdirectory to
15 house any information that is to be shared between volumes. Single-volume docu-
16 ments will also supply some files here. The expected “common” files include:

- 1 **defs.tex** macros defining common terms.
- 2 **units.tex** macros defining how to use quantities and units.
- 3 **preamble.tex** largely including the above to files but any extra L^AT_EX configuration
- 4 that goes before the document environment begins.
- 5 **citedb.bib** the BitTeX database.
- 6 **init.tex** Any content that goes in the document environment but before the first
- 7 chapter. It typically should contain title page, ToC/LoF/LoT.
- 8 **final.tex** Any content that goes in the document after the last chapter. It typically
- 9 should contain the commands related to producing the bibliography.

10 The content of many of these files should in part be kept in sync across all
11 document repositories.

12 Specific documents may place additional files in this `common/` directory that
13 should be shared among the document's volumes. For example, all volumes of the
14 CDR include an `intro.tex` (which further includes `supp-doc-list.tex`).

15 4.4 The main file

16 A new main file will likely be started only by the technical editors. To start a new
17 volume, copy the `guidance.tex` to a new name and edit as directed by the comments.

- 18 1. Set the graphics path
- 19 2. Redefine the volumes sub-title
- 20 3. Input each chapter file.

¹ Bibliography

- ² [1] W. Strunk, Jr. and E. B. White, *The Elements of Style*. Macmillan, third ed.,
³ 1979.