The Compact Muon Solenoid Experiment

CMS Draft Note

Mailing address: CMS CERN, CH-1211 GENEVA 23, Switzerland
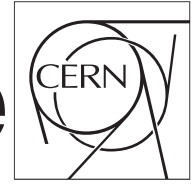
TDR: the Technical Document Repository System
for the storage, concurrent access, and building of CMS reports, notes, and other LaTeX-based documents

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Abstract

This note describes the TDR documentation system for LaTeX-based documents including CMS Technical Design Reports (TDRs), Expressions of Interest (EoIs), Letters of Intent (LoIs), CMS Notes, Internal Notes, and Analysis Notes. It describes the `TDR` svn repository for the storage and concurrent multi-user access of documents and the use of the `tdr` build tool for compiling complete or partial documents from users' LaTeX source and graphics files. This system has been successfully used by hundreds of authors of the CMS Computing TDR, the Physics TDR, and a number of other documents. (See also: `http://cmsdoc.cern.ch/cms/cpt/tdr/`)

This box is only visible in draft mode. Please make sure the values below make sense.

PDFAuthor: George Alverson, Lucas Taylor
PDFTitle: CMS TDR: Technical Document Repository
PDFSubject: CMS
PDFKeywords: CMS, physics, software, computing

Please also verify that the abstract does not use any user defined symbols

Contents

1 Overview

The CMS Technical Document Repository (TDR) system provides a straightforward environment for the preparation of reports and notes by large numbers of authors working concurrently. It comprises the following components:

1.1 TDR Document Repository

All files that are required for the assembly of completed documents are stored in a central version controlled repository, https://gitlab.cern.ch/tdr. The repository contains the common style files and build tools as well as all the user-generated text (LaTeX) files and figures. This system facilitates the sharing of documents, concurrent working, and means that users to only keep files under development in their private areas.

1.2 Document style files

Common LaTeX style files have been pre-defined for CMS Technical Design Reports (also used for EoIs, LoIs, and other large documents), CMS Notes, Internal Notes, Detector Notes, and Analysis Notes. Template examples are provided enabling the user to get started with minimal overhead.

1.3 Document build system

The philosophy of the TDR system is to keep the LaTeX document style commands distinct from the user-content. A `tdr` perl script is then provided that assembles on the fly a complete LaTeX document using pre-existing standard fragments and the users' LaTeX files. It then proceeds to build the document by processing the LaTeX, resolving cross-references and citations (using BibTeX), and creating a PDF (portable document format) file. The user selects the style of the document (CMS Note, Analysis Note, etc.) by specifying an option to the `tdr` command. It is therefore totally trivial to switch from one style to another.

1.4 External software

The system is designed to be independent of the CMS environment. All that is required is `git` (recent versions only), `perl`, and a standard installation of LaTeX. These are already part of the standard CERN Linux environments through the cvmfs file system. It is also relatively easy to install on non-CERN Linux systems, Mac OSX, and Windows.

1.5 Getting started

To **create a new document** in the repository, for example a CMS Note, see section 2.

To **edit the document** once the template has been created, see section 3.

To **build a formatted manuscript** (PDF) for your document see section 4.

For **advice on using LaTeX**, for example to include figures, see section 5.

2 Creating a new document

All files reside in a group of `GitLab` repositories. As long as you are a member of the CMS e-group, you can use a web browser to see the repository: `https://gitlab.cern.ch/tdr`. On any machine with the CMS environment (e.g., `lxplus.cern.ch`) you can check out any of these repos if you are a member of the cms-members e-group. Only individuals included as Developers for individual projects are able to submit changes to a specific repository.

2.1 Creating a new note or analysis summary

To start you will need to request a note directory in the `GitLab` repository from the TDR manager (currently George Alverson). It is best to supply a list of the lxplus usernames of the co-authors who are to have write access to the repository at the time of the request.

To generate output, check out your note directory from `GitLab` following the example below. The `tag` below is the identifier for your paper, typically of the form XXX-YY-NNN. Following the sequence below will populate your local copy of the repository with only your note and not include the other notes. If you have a note, use "notes". For a paper, use "papers."

Check out your note directory from `git` following the example below. The `[tag]` below is the identifier for your paper, typically of the form XXX-YY-NNN. Following the sequence below will populate your local directory with only your note and not include the other notes. If you have a note, use "note" as the type and "notes" in the path to the project [tag].git. For a paper, use "paper" and "papers." [Notes: (1) when running with Kerberos authentication, use `https://:@gitlab.cern.ch:8443/tdr/[papers|notes]/[tag].git`; (2) for ssh, `ssh://git@gitlab.cern.ch:7999/tdr/[papers|notes]/[tag].git`; (3) for http (not recommended), `https://gitlab.cern.ch/tdr/[papers|notes]/[tag].git`. Instructions for setting up ssh key authentication are located at `https://gitlab.cern.ch/help/ssh/README.md`. If your primary account is not a CMS account (group zh), be prepared to use ssh for access.]

```
# an optional mydir directory name can be supplied for the following.
# We recommend just using the default.
# for KRB authentication...
> git clone --recursive https://:@gitlab.cern.ch:8443/tdr/papers/XXX-YY-NNN.git
> cd [tag]
> eval `utils/tdr runtime` # add -csh for csh (or -fish for fish)
# (edit the template, then to build the document)
> tdr  --style=[paper|pas|an|note] b XXX-YY-NNN
# to commit changes back...
git add -a                            # add all files modified
git commit -m "add my new changes"  # to stage your changes
git push                            # to send them back to the repo
```

To update your local copy from the repo, you will need to

```
# gets from the repo and merges automatically
#    with the local copy:
git pull
```

We also recommned working on branches and then merging them back into the master branch. The process might look like:

```
114  git pull
115  git checkout -b [branch name]
116  # make your edits and test
117  git push origin [branch name]
118  # check again using continuous integration (CI) tests
119  # submit merge request. After merge:
120  git checkout master
121  git pull # back where we started
```

2.1.1 Working at FNAL: The LPC

The LPC environment has a script, `/uscmst1/prod/sw/cms/[cshrc|shrc]`, which sets up a number of aliased commands for working on CERN resources while at FNAL.

The `kserver_init` command will initialize the KRB5CCNAME file and allow for seamless communication without further intervention.

2.1.2 Naming convention for Analysis Notes and Physics Analysis Summaries

A new directory is created in the `tdr/notes` directory, named according to the convention chosen by the analysis group, e.g. `TOP-07-005`. Once created, this directory will contain a template note named according to the analysis name, e.g. `TOP-07-005.tex`. The `tdr` script will automatically generate the `cmsNoteHeader` from the directory name.

2.1.3 Special note on Physics Analysis Summaries

PAS documents are loaded into the CDS archives after approval. At this point, the title *as stored in the `hypersetup pdftitle` field* is passed to CDS as the document title. The CDS display will use MathJax to display this. The abstract is taken from the `abstract` LaTeX version. MathJax will not see any TeX macros, however, so those should used with care.

2.1.4 Naming convention for CMS Notes, and Internal Notes

A new directory is created in the `tdr/notes` directory, named according to the convention: `contactAuthor_serialNo`. `contactAuthor` is the CMS username (see the CERN "phone-book" command) which is used for subsequent access control. `serialNo` is a simple serial number (001, 002,…) for the note generated at the time of the request; it is *not* anything to do with the final CMS note number which will be assigned independently during the review process. For example the first note requested by Paris Sphicas resides in the directory `tdr/notes/sphicas_001`. Once created, this directory will contain a template note called `contactAuthor_noteNo.tex` and a sub-directory called `fig` in which figures (PDF files) may be stored.

2.2 Creating a new Technical Design Report (or LoI, EoI, etc.)

For major reports, a new directory is created in the reports directory, e.g., `tdr/reports/p1utp` for the Phase 1 Upgrade Technical Proposal. This directory will contains the following sub-directories:

- `tex` - latex files and subdirectories (e.g., for different chapters);
- `fig` - figure files and subdirectories;
- `bib` - bibtex file(s) for references.

154 Note that for TDRs this sub-structure is assumed to exist by the `tdr` script (described below);
155 if you change it things may fail.

3 Modifying a document and working with git

Please make sure to configure your git client:

```
git config --global user.name "Your preferred name"
git config --global user.email "Your-Email-Address"
# failure to set the next option can lead to the message
# 'Basic: Access denied'
# if you use KRB access (http)
git config --global http.emptyAuth true
```

There are other useful settings as well. For example, to stop git from asking to commit backup files and object files, you can globally exclude files using a /git/ignore file:

```
*.O
*.bak
*~
```

Note specific excludes can be set in a .gitignore file in the top directory. [See https:// git-scm.com/docs/gitignore.]

Filenames should not contain any of the following characters:

```
/\?%*:|"<>
```

plus space. The dot (.) when used as anything but a filetype extension can also can cause problems. The usual reserved filenames for the varying OSs should also be avoided, e.g., CON, AUX, COMn, LPTn, PRN, NUL, with any extension and any combination of upper/lower case. File paths should not exceed 250 characters.

3.1 Checking out desired files

Checkout the directory which contains the source files of the document you wish to work on. In addition to your specific note directory, you will see the following general files/directories:

- tdr - a script for building documents (described below);
- utils/general - a R/O directory containing the style files.

3.2 Editing the document

Simply edit any of the LaTeX files with your favourite text editor. For example, for a new note, start with the file contactAuthor_noteNo.tex.

3.3 Committing your changes into the GitLab repository

Before committing any changes always check your changes are valid LaTeX, otherwise you will break the document for all other authors.

Firstly, check the local file, e.g., myfile.tex by doing tdr build myfile.

If myfile.tex is included in a bigger document, e.g., ctdr.tex, then you must also check that this builds: tdr build ctdr. In both cases you should check that a valid PDF file is produced that looks as expected. LaTeXis rather verbose with its warnings, however it is imperative to look and verify that there are no **error** messages, and no **unresolved** references.

Changes to files are committed to (i.e. stored into) the repository using

```
> git add [modified_files]
> git commit -m''Comment explaining changes made''
> git push
```

The -m option should supply a short descriptive message.

It is not sufficient to just do a `git commit`. New files must be first added, then committed, and finally pushed to get them on the central server.

3.3.1   Checking everything is OK with git

If you want to see the status of your local files compared to the repository type:

```
git diff origin/master
```

3.4   Creating a standalone paper, e.g., for submission to a journal

If you wish to export your paper (for publication, local work or for security), you can produce a tarball with all the necessary files with

```
> tdr --style=note --export b mynote.
```

This will function on Unix or Windows systems which have recent copies of LaTeX (including $\mathcal{A}\mathcal{M}\mathcal{S}$-LaTeX) and `perl` installed.

Please see also section 4.8 on formatting for journals.

4   Building a formatted manuscript

The LaTeX file(s) must be processed to produce a fully typeset and formatted manuscript in PDF (Portable Document Format). A `tdr` perl script is provided for building the whole or parts of your document, as described below. There is no need use any of the following commands yourself: `latex`, `pdflatex`, `pdftex`, `bibtex`, `dvips`, or `dvi2pdf`. They are all replaced by the `tdr` script.

4.1   Initializing your environment

Set up the runtime environment by typing:

```
> eval `./tdr runtime -sh`     // if you use Bourne-shell or Korn shell
> eval `./tdr runtime -csh`    // if you use c-shell or tc-shell
```

This must be done from the top-level directory of the checked out area, i.e. the location of the `tdr` script. Note also that the syntax uses single *back* quotation marks.

The `tdr` command has a simple scram-like syntax with `runtime`, `build`, `clean`, and `veryclean` commands, support for one-letter abbreviations and so on. For details on `tdr` options type:

```
> tdr help
```

4.2   Building a PDF file from a LaTeX file

To create a PDF file from a LaTeX file `myPaper.tex`, simply type:

```
> tdr build myPaper      (or simply:  tdr b myPaper)
```

Assuming the LaTeX files have no errors in them, the last line of the screen output will tell you the location of the output PDF file. It is stored in the top-level `tmp` directory together with various log files.

If the build fails, check the printout on the screen for LaTeX errors and resolve them; typically these are trivial syntax errors. Then run the build again.

4.3   Choosing the document style

You can choose to format the paper according to various pre-defined styles using the `style` option, for example:

```
> tdr --style=note  build  myPaper
```

will format the paper as a CMS Note. Valid styles are

- `tdr` for large reports (the default),
- `paper` for a paper to be submitted to a journal,
- `note` for CMS Notes,
- `an` for Analysis Notes,
- `pas` for Physics Analysis Summaries,
- `dn` for Detector Notes.

Note that PAS documents can be in either draft mode (the default), or non-draft, as set by the `--nodraft` switch.

4.4 What your LATEX files should (not) contain

The `tdr` script makes a copy of your simple LATEX file and automatically inserts all the required LATEX boilerplate commands to produce a fully consistent LATEX document in the `tmp` directory, in accordance with the CMS document style requested in the command line options (see above). It then processes the document using PdfLATEX with several passes to resolve cross references; citations are handled using BibTeX.

Therefore, it should be stressed that the file `myPaper.tex` should *not* contain any document definition commands (e.g., `\documentclass`, `\begin{document}` and so on).

4.5 Making partial builds

To speed things up, especially for large documents, the `tdr` command can build single chapters, sections, or indeed any arbitrary LATEX files. For example, if your main file is called `myPaper.tex` and looked like:

```
\input{titlepage.tex}
\input{introduction.tex}
\input{data-analysis.tex}
\input{results.tex}
```

then you could use the following commands

```
> tdr build myPaper   // build everything as a single PDF paper
> tdr b results       // build just the results section as PDF
```

In general you should be in the directory in which the LATEX file resides. The script will search downwards in the directory tree for it, but if more than one version exists, it will not be able to determine which one to build. This situation (multiple copies of the top file) is guaranteed to occur once a tag or branch has been made, so it is important to note this.

4.6 Setting the default file to build

To save specifying your preferred build target (e.g., `myPaper.tex`) each time, just set the Unix environmental variable `TDR_TARGET` to `myPaper`. Then you can just type

```
> tdr b
```

If `TDR_TARGET` has not been set, then `tdr` builds this document.

A similar variable, `TDR_STYLE`, controls the default style.

4.7 Cleaning up

To clean up temporary files (i.e the locally-created `tmp` directory):

```
> tdr clean
```

To clean up temporary files and emacs and nedit backup files:

```
> tdr veryclean
```

4.8 Formatting for journals

You can produce versions of your document formatted following the standards of several of the journals to which CMS submits physics results. Journal-specific options are passed as strings. To use our defaults, use a single dash as the option:

```
tdr --style paper --aps - b XXX-08-000
```

Please note that the `tdr` script can automatically take the pdfkeywords and format them for the equivalent journal field.

APS use the normal command for a paper, but add the appropriate APS options with, e.g., `--aps="reprint,prl,linenumbers"`. See the revtex documentation for details on APS options. Information on the revtex style for use with APS journals can be found at `http://authors.aps.org/revtex4/` and download sites are listed at `https://authors.aps.org/revtex4/revtex4_faq.html#download`. APS does not accept sub-directories nor included TEXfiles, so the necessary files will either be included or moved to the top level, as appropriate, for submission.

PLB use `--plb="3p,twocolumn,times"` or any other set of Elsevier options. See `http://www.elsevier.com/framework_authors/misc/elsdoc.pdf` for details on the Elsevier elsarticle style. As for the APS, PLB only accepts a flat file structure. The PLB default bib style will convert to lowercase all except the first word in the titles of references, so escape proper names, acronyms, etc., with curly braces, e.g., "Search for {ADD} extra dimensional gravity..."

EPJC Please provide (using the if-then construction described below) a `\titlerunning` in the text before the `\maketitle`. This is used to create a running head so it cannot be longer than roughly half a page width. When EPJC sets articles, they tend to use the `\sidecaption` macro and have caption plus two small plots run across the full page. This option is not accessible in the CMS style although one can pass it to the EPJC style via an if-then.

JHEP JHEP accepts papers in the CMS style.

For instances where the CMS style and the journal style are incompatible, one may use an *if-then* construction to bracket alternatives:

```
\ifthenelse{\boolean{cms@external}}{%
%% journal specific text
}
{%
%CMS specific text
}
```

Note, however, that many formatting changes that are required for the two-column format of many journals can be accommodated in the standard CMS style. Using the ⋆ format for figures that should extend across two columns does not effect placement for us. If you resize figures, use units of `\columnwidth`, which is the same as the `\textwidth` in single column format.

4.9 Supplemental material for journals

Supplemental material should be placed in an independent LaTeX file, e.g., supplemental_material.tex. This file will be included via conditional code in the main document (say GEN-12-001.tex, representing a GENeric document) when it is formatted for CMS and for the arXiv, and excluded in the journal version. A third file, GEN-12-001_supp.tex should have the supplemental material included wrapped in a standard document template, which will provide an independent file for uploading to the journal. So for GEN-12-001.tex,

```
...
\bibliography{auto_generated}
\ifthenelse{\boolean{cms@external}}{}{
\clearpage
\appendix
\numberwithin{table}{section}
\numberwithin{figure}{section}
\section{Supplemental information title\label{app:suppMat}}
\input{supplemental_material}
}
```

while for GEN-12-001_supp.tex,

```
\title{GEN-12-001 normal title \texorpdfstring{\\[1cm]
---Supplemental Material---}{: Supplemental Material}}
\author[cern]{The CMS Collaboration}
\date{\today}
\abstract{}
\hypersetup{%
...}
\maketitle
\null\cleardoublepage
\input{supplemental_material}
```

The title of GEN-12-001 should be modified from that of the normal document: `\title{Normal Title\\[1cm]—Supplemental Material—}`. To generate all three types of files, arXiv (same as CMS format), PRL, and PRL supplement, the commands would be

```
tdr --style paper --aps - b GEN-12-001
tdr --style paper  b GEN-12-001
tdr --style paper --supplement --no-draft --preflight b GEN-12-001_supp
```

You should specifically note how the supplemental material is referenced within the main file: the APS specifies, for instance, that the format for the reference in the text is "See Supplemental Material at [URL will be inserted by publisher] for [give brief description of material]," so we use (for example) "The results are available in tabulated form in `\suppMaterial`", where we have defined `\suppMaterial` in the GEN-12-001_supp.tex file as

```
\ifthenelse{\boolean{cms@external}}
{\providecommand{\suppMaterial}{the supplemental material
  [URL will be inserted by publisher]}}
{\providecommand{\suppMaterial}{Appendix~\ref{app:suppMat}}}
```

363 In the absence of a table of contents we can freely substitute anything we like for "Appendix" in
364 the string above. If there is a table of contents, the `\appendixname` should be conditionally re-
365 defined so that in CMS format it would be `\renewcommand{\appendixname}{Supplemental`
366 `Material}`.

5   Advice on using LATEX

5.1   LATEX macros for commonly used constructs

Provisions are made to implement macros across TDR volumes, within a volume, or even locally in a particular section. However, in order to establish a standard look and feel for the text symbols in the TDR volumes (such as for E_T and p_T), we encourage use of the generally defined macros and strongly discourage local use unless you are certain a similar symbol would not be used by another editor.

At the top-most level, definitions defined in `tdr/utils/general/ptdr-definitions.sty` are available to all TDR volumes. An extensive set of macros have been defined there and should be used whenever possible. They include, for example, `\ET`, `\fbinv`, `\sTop`, etc. At the top-level of each TDR (e.g., in `tdr/reports/ptdr1/tex/definitions.tex`, there is another file `definitions.tex` for volume-specific definitions. Macros should be suggested and implemented for frequently used constructs or common symbols or names, e.g., `\etc` could be defined to produce "*etc.*" and so on. The macros in the `definitions.tex` files are usable in tex files at all levels of the particular TDR.

Use `\newcommand` to define a new command that does not exist, `\renewcommand` to re-define a new command that already exists, or `\providecommand` to define a new command but accept the old definition without complaint if it has already been defined.

To override a general definition in `TDR/general/ptdr-definitions.sty` simply (re-)define it (using `\newcomand` or `\renewcommand`) in the local `definitions.tex`. But please consult with the appropriate TDR editor first.

We stress that it is important to use the macros in case a global style change must be made to suit the standards of a particular journal.

5.2   Fonts

Do not override the default fonts. They are currently set to be Palatino and Helvetica. The math fonts have also been changed to Palatino so that they do not clash with the body text, particularly in regards to numbers and units. This means the authors should use `\text` commands to put text in subscripts and superscripts, and most importantly *do not use* `\rm` in formulas, otherwise you will end up with formulae looking like the second one below.

$$\phi = \text{a Greek letter} \tag{1}$$
$$\text{Œ} = \text{a mistake} \tag{2}$$

Also note that the math fonts include a full set of Greek symbols in Math Italic Bold (produced with `\mathbold`), but only uppercase in Math Bold (`\mathbf`). Use `\boldmath` or `\boldsymbol` to get bold symbols: `{\boldmath{$\alpha \otimes \beta$}}` : $\boldsymbol{\alpha \otimes \beta}$. (Note the enclosing braces.) Most journal styles do not have the `\boldmath` command.

It is also advisable to use the `\textrm{Some text}` form rather than `{\rm Some text}`. The same is true for the other short-form holdovers from plain TEX, `\tt` and `\it`, particularly if you would like to submit your paper to a journal with minimal re-editing. For inclusion of text within an equation, `\text` should be used.

5.3 Editorial macros

In addition to the extensive measurement and physics symbols, some editorial macros are defined in `tdr/utils/general/definitions.tex` as well. For example, the following tex fragment:

```
\editor{Jane Doe} \\
\contributor{Tom Cobbley} \\
\fixme{check this number!} \\
```

produces the following.

Editor(s): Jane Doe

Contributor(s): Tom Cobbley

FIXME: check this number!

Notes use `author`, `address`, and `abstract` commands.

5.4 Inclusion of figures

Figures should reside in the `fig` directory of the corresponding TDR (volume). A figure may be included as follows:

```
Figure~\ref{fig:test} shows a figure prepared with the TDR
template and illustrates how to include a picture in a document
and refer to it using a symbolic label.
\begin{figure}[!htb]
    \centering
    \includegraphics[width=0.55\textwidth]{c1_BlackAndWhite}
    \caption[Caption for TOC]{Test of graphics inclusion.\label{fig:test}}
\end{figure}
```

Please note that documents intended for journal submission should usually include the `fig` in the path name supplied to `includegraphics` and not rely on the automatic search.

The result of the above is roughly as follows:

Figure 1 shows a figure prepared with the TDR template and illustrates how to include a picture in a document and refer to it using a symbolic label.

Note that the file extension (type) for the filename (e.g., `c1_BlackAndWhite.pdf` above) is not explicitly specified. Also note that authors should use an alternate short caption within the first set of brackets when the complete caption is unduly long for including in the list of figures in the Table of Contents.

Also note that the current recommended size for figures is $0.55\textwidth$ for square plots, and $0.7\textwidth$ for ones with a standard (i.e., produced using the root template described in Section 5.4.5) rectangular aspect ratio.
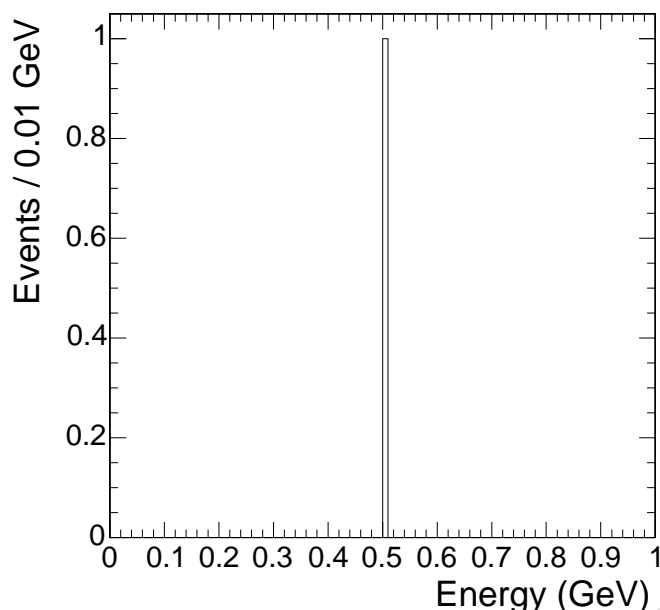
Figure 1: Test of graphics inclusion.

Finally, note that correct results for the labeling occur only if you place the `label` command within the caption environment.

5.4.1 Colour figures

Figures will generally be printed in black and white for paper versions of the final document. We have found that the automatic conversion of colour figures to black and white often results in a lack of legibility, so we recommend that all authors provide a black and white version for each figure which they have checked for legibility on an actual paper copy. If paper output is not required or the authors are satisfied with dual-purpose figures, the rest of this section can be ignored.

Colour versions of figures can by provided for PDF output using the `combinedfigure` macro in place of the `\includegraphics` command. This takes two arguments corresponding respectively to the black and white and the coloured versions of the same picture, for example:

```
Figure~\ref{fig:test} shows a figure prepared with the TDR
template and illustrates how to include a picture in a document
and refer to it using a symbolic label.
\begin{figure}[!htb]
    \centering
    \combinedfigure{width=0.4\textwidth}{c1_BlackAndWhite}{c1_Colour}
    \caption[Caption for TOC]{Test of graphics inclusion.\label{fig:test}}
\end{figure}
```

Both figures should have the same size or the pagination may be affected.

5.4.2 How to include multiple figures

If you need to include multiple figures into the figure environment (i.e., you need only one common caption), the recommended procedure is to use multiple instances of the `\includegraphics`

command, combined with the `tabular` environment if needed. Please do not use the `subfig` environment just to get "(a)" and "(b)" labels, it is a waste of white space and does not look as nice as putting the labels directly on the plot. Moreover, do not use the `picture` environment to draw the labels, because the coordinate system is absolute on the page and not relative to where the figure will be placed (i.e., this only works for the very final version). In short, to label multiple figures, it is best to embed the label into the plot.

5.4.3   How to handle figures in PDF, jpeg, and PS formats

Files with extensions of `.pdf` (recommended) and `.jpg` are automatically picked up. Direct import of `.eps` files is not supported by the `pdftex` driver which is used to convert LaTeX to PDF. You are advised to convert your `.eps` file to a `.pdf` file using Adobe Acrobat (best results), the `epstopdf` command or `ps2pdf -dEPSCrop`, and commit that to `svn`. Try to avoid converting figures through an intermediate program, such as Powerpoint, and instead convert the natively produced Postscript. If you do convert an EPS file, you are encouraged to also commit the original EPS version as well in case of conversion problems found later. The editors may re-convert if necessary.

5.4.4   Where to store figures

In general the figures should reside in the `fig` directory or one of its subdirectories. A `fig` directory exists for each major document, e.g., `tdr/reports/ptdr1/fig/` or `tdr/reports/ctdr/fig/`. Small papers with only a few figures do not require the use of a subdirectory.

Do *not* refer to any figures which reside outside the TDR repository; instead, `svn add` the file in the `fig` directory and check it in.

By default figures are looked for in the `fig` directory.

If a figure file resides in a subdirectory, e.g., `fig/muon`, of the `fig` directory, then simply prepend the directory name when referring to the figure in the `\includegraphics` command (i.e. `muon/c1` in the above example).

5.4.5   Standard macro for figures produced with ROOT

To maintain a standard look and feel for the figures in the Physics TDRs, a Root macro was contributed by Thomas Speer. Figure 1 shows an example plot made using it. In the TDR repository check out: `tdr/utils/general/tdrstyle.C`. To use it:

```
.L tdrstyle.C
setTDRStyle()
```

5.5   Convention for figure and table captions

Figure captions should be located below each figure, as shown in the example above. Table captions, however, should reside *above* the table and use `topcaption`. For example:

```
\begin{table}[h]
  \begin{center}
    \topcaption{Table captions are above the table whereas figure
    captions are below.}
    \label{tab:mytab}
    \begin{tabular}{lcc} \hline
```

```
508        Parameter & Value 1 & Value 2 \\ \hline
509        $s$ & 10.0 & 20.0 \\
510        $t$ & 20.0 & 30.0 \\
511        $u$ & 30.0 & 40.0 \\ \hline
512     \end{tabular}
513   \end{center}
514 \end{table}
```

which produces the following:

Table 1: Table captions are above the table whereas figure captions are below.

Parameter	Value 1	Value 2
s	10.0	20.0
t	20.0	30.0
u	30.0	40.0

5.6 Chapters, sections and other sectioning commands

For all notes use the following section heading commands: `\section`, `\subsection`, `\subsubsection`, and `\paragraph`. For Technical Design Reports the top-level sectioning command is `\chapter` followed by all the above sectioning commands.

The PDF bookmarks produced from PdfLaTeX will choke on TeXsymbols, e.g., "2.6 This is a "026E30Fsection" for "2.6 This is a \section" since TeX uses 026E30F to represent the backslash. Use the `\texorpdfstring` macro:

```
523 \section{Finding the split \texorpdfstring{$A_2$}{A2}}
```

And this is what it should look like:

5.7 This is a `\subsection`

This is some text.

5.7.1 This is a `\subsubsection`

This is some text.

5.7.1.1 This is a `\paragraph`   This is some text.

5.8 Cross-references and bibliographic citations

5.8.1 Referring to Sections, Figures, Tables, etc.

LaTeX provides powerful, robust, and scalable facilities for cross-referencing based on symbolic labels. Please use them!

For example, to create symbolic links to a chapter and a section:

```
535     \chapter{Mass Storage Systems\label{ch:mss}}
536     \section{Requirements\label{sec:mss-requirements}}
```

Note that the `label` command is contained *within* the curly braces of the appropriate sectioning command so that the value can be resolved correctly. For figures and tables, the `label` command should be similarly enclosed within the associated `caption` command.

To then refer to the chapter and section:

```
The CMS hierarchical mass storage systems, described in
Chapter~\ref{ch:mss} will be of a size unprecedented in
HEP, as described in Section~\ref{sec:mss-requirements}.
```

This will result in output something like:

> The CMS hierarchical mass storage systems, described in Chapter 9 will be of a size unprecedented in HEP, as described in Section 9.1.

Note that the numbers (9 and 9.1) are automatically generated according to the placement of the `label` commands in the overall context of the document. The number of digits (levels) is determined automatically from the level of the sectioning command used (chapter, section, subsection, etc.).

Always – *repeat always* – use symbolic labels (e.g., `sec:mss-requirements`) for references and not hardwired numbers (e.g., `9.1`) as the latter will invariably become wrong very quickly.

5.8.2 Bibliographic references

All bibliographic entries are defined in a BibTeX file (i.e., files with `.bib` extension in the `bib` directory of the TDR (volume) of interest. This enables a standard format to be ensured and helps avoid duplicated entries. Before defining a new bibliographic item, please check in the `.bib` files whether it has already been defined, and if so then use it as it is. When creating new BibTeX entries, the format of the bibliographic entries is mostly self-evident and one can cut-and-paste from an existing entry (well, check that it produces reasonable output) and then change the text.

Keep in mind that for listing authors, the BibTeX implementation uses "Last Name, First Name" (and it automatically abbreviates the first name). Concatenate authors using "and", and instead of writing "*et al.*" use "and others." BibTeX will handle the substitution, and our style file will trim the author list automatically after three authors. For complicated names, you can place them in braces , but do this sparingly.

We strongly recommend the use of the inSPIRE BibTeX labels when such an article can be found there, because a unique label is created and LaTeX can spot multiply-defined references. It also saves you the time of creating the entry yourself. Such an entry looks like:

```
@Article{Agostinelli:2002hh,
     author    = "Agostinelli, S. and others",
     collaboration = "GEANT4",
     title     = "{GEANT4}---a simulation toolkit",
     journal   = nim,
     volume    = "A506",
     year      = "2003",
     pages     = "250-303",
     SLACcitation  = "%%CITATION = NUIMA,A506,250;%%",
```

```
578    DOI       = "10.1016/S0168-9002(03)01368-8"
579  }
```

However, in the above instance and for many other *commonly* cited references, we will use a more conventional name (e.g., GEANT4 instead of Agostinelli:2002hh). So please check the other bibliography files to see if yours is already defined. The information should also be verified. In the above citation, the title was not quite right on inSPIRE.

In addition, we recommend setting the "DOI" field that was added to the Article BibTeX format in the TDR framework (and is illustrated above). This field represents the Digital Object Identifier for your reference.[1] When you prepend this number with `http://dx.doi.org/`, your browser is automatically directed to the electronic version of the article (provided your institution has paid for this access). Currently you need to manually determine and enter this field after examining the publication.

To refer to an item in the bibliography using its symbolic label in your text, use one of the following forms:

```
Either: the CMS detector is described elsewhere~\cite{CMSTP};
or: the CMS detector is described in reference~\citenum{CMSTP}.
```

This will result in output something like:

> Either: the CMS detector is described elsewhere [34]; or: the CMS detector is described in reference 34.

Note the omission of the square brackets in the second form, where the reference is explicitly (rather than parenthetically) referred to.

The list of references will be placed at the end of the TDR. It is suggested that each group maintain a separate `.bib` file in the `bib` directory for the chapter specific references. Common references for the entire TDR will be kept in a common file (e.g., ptdr1.bib). Common software references will be kept in software.bib.

5.8.3 Web References

Please use the `\href` and `\url` commands to embed links into your document (these are not allowed in journal submissions).

Example:
`\url{http://cms.cern.ch/iCMS/}` gives `http://cms.cern.ch/iCMS/`,
`\href{http://cms.cern.ch/iCMS/}{The CMS web site}` gives The CMS web site.

5.9 Glossary

Please add a short entry to `glossary.tex` whenever introducing any new acronym or abbreviation. Even plain English terms with specific technical meaning should be included (e.g., Python).

---

[1] `http://www.doi.org/`

6 PTDR Symbol Definitions

614	etal:	et al.
615	ie:	i.e.
616	eg:	e.g.
617	etc:	etc.
618	vs:	*vs.*
619	mdash:	–
620	NA:	—
621	Lone:	Level-1
622	Ltwo:	Level-2
623	Lthree:	Level-3
624	ACERMC:	ACERMC
625	ALPGEN:	ALPGEN
626	BLACKHAT:	BLACKHAT
627	CALCHEP:	CALCHEP
628	CHARYBDIS:	CHARYBDIS
629	CMKIN:	CMKIN
630	CMSIM:	CMSIM
631	CMSSW:	CMSSW
632	COBRA:	COBRA
633	COCOA:	COCOA
634	COMPHEP:	COMPHEP
635	EVTGEN:	EVTGEN
636	FAMOS:	FAMOS
637	FASTJET:	FASTJET
638	FEWZ:	FEWZ
639	GARCON:	GARCON
640	GARFIELD:	GARFIELD
641	GEANE:	GEANE
642	GEANTfour:	GEANT4
643	GEANTthree:	GEANT3
644	GEANT:	GEANT
645	HDECAY:	HDECAY
646	HERWIG:	HERWIG
647	HERWIGpp:	HERWIG++
648	POWHEG:	POWHEG
649	HIGLU:	HIGLU
650	HIJING:	HIJING
651	HYDJET:	HYDJET
652	IGUANA:	IGUANA
653	ISAJET:	ISAJET
654	ISAPYTHIA:	ISAPYTHIA
655	ISASUGRA:	ISASUGRA
656	ISASUSY:	ISASUSY
657	ISAWIG:	ISAWIG
658	MADGRAPH:	MADGRAPH
659	MCATNLO:	MC@NLO
660	MCFM:	MCFM
661	MILLEPEDE:	MILLEPEDE
662	ORCA:	ORCA
663	OSCAR:	OSCAR
664	PHOTOS:	PHOTOS
665	PROSPINO:	PROSPINO
666	PYTHIA:	PYTHIA
667	SHERPA:	SHERPA
668	TAUOLA:	TAUOLA
669	TOPREX:	TOPREX
670	XDAQ:	XDAQ
671	MGvATNLO:	MADGRAPH5_aMC@NLO
672	DZERO:	D0
673	de:	$^{\circ}$
674	ten{x}:	$\times 10^{x}$
675	unit{x}:	x
676	mum:	μm [Most units include leading thinspace]
677	micron:	μm
678	cm:	cm
679	mm:	mm
680	mus:	μs
681	keV:	keV
682	MeV:	MeV
683	MeVns:	MeV [*no* leading thinspace with *ns* suffix]
684	GeV:	GeV
685	GeVns:	GeV
686	gev:	GeV
687	TeV:	TeV
688	TeVns:	TeV
689	PeV:	PeV
690	keVc:	keV/c
691	MeVc:	MeV/c
692	GeVc:	GeV/c
693	GeVcns:	GeV/c
694	TeVc:	TeV/c
695	keVcc:	keV/c^2
696	MeVcc:	MeV/c^2
697	GeVcc:	GeV/c^2
698	GeVccns:	GeV/c^2
699	TeVcc:	TeV/c^2
700	pbinv:	pb^{-1}
701	fbinv:	fb^{-1}
702	nbinv:	nb^{-1}
703	mubinv:	μb^{-1}
704	mbinv:	mb^{-1}
705	percms:	cm^{-2} s^{-1}
706	lumi:	$\mathcal{L}$
707	Lumi:	$\mathcal{L}$
708	LvLow:	$\mathcal{L} = 10^{32}$ cm^{-2} s^{-1}
709	LLow:	$\mathcal{L} = 10^{33}$ cm^{-2} s^{-1}
710	lowlumi:	$\mathcal{L} = 2 \times 10^{33}$ cm^{-2} s^{-1}
711	LMed:	$\mathcal{L} = 2 \times 10^{33}$ cm^{-2} s^{-1}
712	LHigh:	$\mathcal{L} = 10^{34}$ cm^{-2} s^{-1}
713	hilumi:	$\mathcal{L} = 10^{34}$ cm^{-2} s^{-1}

714	PT:	p_T
715	pt:	p_T
716	ET:	E_T
717	HT:	H_T
718	mT:	m_T
719	mTii:	m_{T2}
720	et:	E_T
721	Em:	$\not{E}$
722	Pm:	$\not{p}$
723	PTm:	$\not{p}_T$
724	PTslash:	$\not{p}_T$
725	ETm:	E_T^{miss}
726	MET:	E_T^{miss}
727	ETmiss:	E_T^{miss}
728	ptmiss:	p_T^{miss}
729	ETslash:	$\not{E}_T$
730	VEtmiss:	$\vec{E}_T^{miss}$
731	ptvec:	$\vec{p}_T$
732	ptvecmiss:	$\vec{p}_T^{miss}$
733	tauh:	τ_h
734	sqrtsNN:	$\sqrt{s_{NN}}$
735	mht:	H_T^{miss}
736	htvecmiss:	$\vec{H}_T^{miss}$
737	dd{y}{x}:	$\frac{\mathrm{d}y}{\mathrm{d}x}$
738	ddinline{y}{x}:	$\mathrm{d}y/\mathrm{d}x$
739	rd:	d
740	re:	e
741	abs{x}:	$|x|$
742	CL:	CL
743	CLs:	CL_s
744	CLsb:	CL_{s+b}
745	zp:	Z'
746	JPsi:	J/ψ
747	Z:	Z
748	ttbar:	$t\bar{t}$
749		
750		
751		
752	Other	
753	AFB:	A_{FB}
754	wangle:	$\sin^2\theta_{eff}^{lept}(M_Z^2)$
755	stat:	(stat) [Includes leading thinspace]
756	syst:	(syst) [Includes leading thinspace]
757	thy:	(theo) [Includes leading thinspace]
758	lum:	(lumi) [Includes leading thinspace]
759	kt:	k_T
760	BC:	B_c
761	bbarc:	$\bar{b}c$
762	bbbar:	$b\bar{b}$
763	ccbar:	$c\bar{c}$

764	qqbar:	$q\bar{q}$
765	MD:	M_D
766	Mpl:	M_{Pl}
767	Rinv:	R^{-1}
768		
769	Older definitions (may be deprecated)	
770	bspsiphi:	$B_s \to J/\psi\,\phi$
771	EE:	e^+e^-
772	MM:	$\mu^+\mu^-$
773	TT:	$\tau^-\tau^+$
774	HGG:	$H \to \gamma\gamma$
775	GAMJET:	$\gamma + \mathrm{jet}$
776	PPTOJETS:	$pp \to \mathrm{jets}$
777	PPTOGG:	$pp \to \gamma\gamma$
778	PPTOGAMJET:	$pp \to \gamma + \mathrm{jet}$
779	MH:	M_H
780	RNINE:	R_9
781	DR:	ΔR
782	ga:	$\gtrsim$
783	la:	$\lesssim$
784	swsq:	$\sin^2\theta_W$
785	cwsq:	$\cos^2\theta_W$
786	tanb:	$\tan\beta$
787	tanbsq:	$\tan^2\beta$
788	sidb:	$\sin 2\beta$
789	alpS:	α_S
790	alpt:	$\tilde{\alpha}$
791	QL:	Q_L
792	sQ:	$\tilde{Q}$
793	sQL:	$\tilde{Q}_L$
794	ULC:	U_L^C
795	sUC:	$\tilde{U}^C$
796	sULC:	$\tilde{U}_L^C$
797	DLC:	D_L^C
798	sDC:	$\tilde{D}^C$
799	sDLC:	$\tilde{D}_L^C$
800	LL:	L_L
801	sL:	$\tilde{L}$
802	sLL:	$\tilde{L}_L$
803	ELC:	E_L^C
804	sEC:	$\tilde{E}^C$
805	sELC:	$\tilde{E}_L^C$
806	sEL:	$\tilde{E}_L$
807	sER:	$\tilde{E}_R$
808	sFer:	$\tilde{f}$
809	sQua:	$\tilde{q}$
810	sUp:	$\tilde{u}$
811	suL:	$\tilde{u}_L$
812	suR:	$\tilde{u}_R$

813	sDw:	$\widetilde{d}$
814	sdL:	$\widetilde{d}_L$
815	sdR:	$\widetilde{d}_R$
816	sTop:	$\widetilde{t}$
817	stL:	$\widetilde{t}_L$
818	stR:	$\widetilde{t}_R$
819	stone:	$\widetilde{t}_1$
820	sttwo:	$\widetilde{t}_2$
821	sBot:	$\widetilde{b}$
822	sbL:	$\widetilde{b}_L$
823	sbR:	$\widetilde{b}_R$
824	sbone:	$\widetilde{b}_1$
825	sbtwo:	$\widetilde{b}_2$
826	sLep:	$\widetilde{l}$
827	sLepC:	$\widetilde{l}^C$
828	sEl:	$\widetilde{e}$
829	sElC:	$\widetilde{e}^C$
830	seL:	$\widetilde{e}_L$
831	seR:	$\widetilde{e}_R$
832	snL:	$\widetilde{\nu}_L$
833	sMu:	$\widetilde{\mu}$
834	sNu:	$\widetilde{\nu}$
835	sTau:	$\widetilde{\tau}$
836	Glu:	g
837	sGlu:	$\widetilde{g}$
838	Wpm:	$W^{\pm}$
839	sWpm:	$\widetilde{W}^{\pm}$
840	Wz:	W^0
841	sWz:	$\widetilde{W}^0$
842	sWino:	$\widetilde{W}$

843	Bz:	B^0
844	sBz:	$\widetilde{B}^0$
845	sBino:	$\widetilde{B}$
846	Zz:	Z^0
847	sZino:	$\widetilde{Z}^0$
848	sGam:	$\widetilde{\gamma}$
849	chiz:	$\widetilde{\chi}^0$
850	chip:	$\widetilde{\chi}^+$
851	chim:	$\widetilde{\chi}^-$
852	chipm:	$\widetilde{\chi}^{\pm}$
853	Hone:	H_d
854	sHone:	$\widetilde{H}_d$
855	Htwo:	H_u
856	sHtwo:	$\widetilde{H}_u$
857	sHig:	$\widetilde{H}$
858	sHa:	$\widetilde{H}_a$
859	sHb:	$\widetilde{H}_b$
860	sHpm:	$\widetilde{H}^{\pm}$
861	hz:	h^0
862	Hz:	H^0
863	Az:	A^0
864	Hpm:	$H^{\pm}$
865	sGra:	$\widetilde{G}$
866	mtil:	$\widetilde{m}$
867	rpv:	$\not{R}$
868	LLE:	$LL\bar{E}$
869	LQD:	$LQ\bar{D}$
870	UDD:	$\overline{UDD}$
871	Lam:	λ
872	Lamp:	λ'
873	Lampp:	λ''

7 Particle symbols: PENNAMES2

——Standard model bosons and Higgs——

Pg:	g	
PGg:	γ	
PW:	W	
PWpm:	$W^{\pm}$	
PWmp:	$W^{\mp}$	
PWp:	W^{+}	
PWm:	W^{-}	
PZ:	Z	
PZz:	Z^{0}	
PH:	H	
PHz:	H^{0}	
PWDt:	W_{2}	

$-$W and Z Bosons outside Standard Model$-$

PWpDt:	W_{2}^{+}
PWpr:	W'
PWL:	W_{L}
PWR:	W_{R}
PZpr:	Z'
PZprpr:	Z''
PZst:	Z^{*}
PZzDt:	Z_{2}^{0}
PZzDT:	Z_{3}^{0}
PZL:	Z_{L}
PZLR:	Z_{LR}
PZR:	Z_{R}
PZGc:	Z_{χ}
PZGe:	Z_{η}
PZGy:	Z_{ψ}

————————LEPTONS————————

Pl:	l
PlR:	l_{R}
Plpm:	$l^{\pm}$
Plp:	l^{+}
Plm:	l^{-}
PlmR:	l_{R}^{-}
PAl:	$\bar{l}$
PGnl:	ν_{l}
PAGnl:	$\overline{\nu}_{l}$
Pe:	e
Pepm:	$e^{\pm}$

Pemp:	$e^{\mp}$
Pem:	e^{-}
Pep:	e^{+}
PGb:	β
PGbm:	β^{-}
PGbp:	β^{+}
PGm:	μ
PGmpm:	$\mu^{\pm}$
PGmm:	μ^{-}
PGmp:	μ^{+}
PGt:	τ
PGtpm:	$\tau^{\pm}$
PGtm:	τ^{-}
PGtp:	τ^{+}
PGtpr:	τ'
PGtprm:	τ'^{-}
PGtprp:	τ'^{+}
PGn:	ν
PGne:	ν_{e}
PGnGm:	ν_{μ}
PGnGt:	ν_{τ}
PGnGtpr:	$\nu_{\tau'}$
PAGn:	$\overline{\nu}$
PAGne:	$\overline{\nu}_{e}$
PAGnGm:	$\overline{\nu}_{\mu}$
PAGnGt:	$\overline{\nu}_{\tau}$
PAGnGtpr:	$\overline{\nu}_{\tau'}$
PL:	L
PLm:	L^{-}
PLp:	L^{+}
PLz:	L^{0}
PLpm:	$L^{\pm}$
PAL:	$\overline{L}$

————————QUARKS————————

PQq:	q
PQd:	d
PQu:	u
PQs:	s
PQc:	c
PQb:	b
PQt:	t

957	PQbpr:	b'	1000	PGDp:	Δ^+
958	PQtpr:	t'	1001	PGDz:	Δ^0
959	PAQq:	$\overline{q}$	1002	PGDm:	Δ^-
960	PAQd:	$\overline{d}$	1003	PGDP{x}:	$\Delta(x)$
961	PAQu:	$\overline{u}$	1004	PGDppP{x}:	$\Delta(x)^{++}$
962	PAQs:	$\overline{s}$	1005	PGDpP{x}:	$\Delta(x)^+$
963	PAQc:	$\overline{c}$	1006	PGDzP{x}:	$\Delta(x)^0$
964	PAQb:	$\overline{b}$	1007	PGDmP{x}:	$\Delta(x)^-$
965	PAQt:	$\overline{t}$	1008	PGQpP{x}:	$\Theta(x)^+$
966	PAQbpr:	$\overline{b}'$	1009	PGFP{x}:	$\Phi(x)$
967	PAQtpr:	$\overline{t}'$	1010	PGL:	Λ
968	PQqb:	q_b	1011	PAGL:	$\overline{\Lambda}$
969	PQqbpr:	$q_{b'}$	1012	PGLP{x}:	$\Lambda(x)$
970	PQqc:	q_c	1013	PGLc:	Λ_c
971	PQqd:	q_d	1014	PGLpc:	Λ_c^+
972	PQqdR:	q_{dR}	1015	PGLpcP{x}:	$\Lambda_c(x)^+$
973	PQqs:	q_s	1016	PGLb:	Λ_b
974	PQqt:	q_t	1017	PGLzb:	Λ_b^0
975	PQqtpr:	$q_{t'}$	1018	PGS:	Σ
976	PQqu:	q_u	1019	PAGS:	$\overline{\Sigma}$
977	PQquR:	q_{uR}	1020	PGSpm:	$\Sigma^\pm$
978	PAQqb:	$\overline{q}_b$	1021	PGSm:	Σ^-
979	PAQqbpr:	$\overline{q}_{b'}$	1022	PGSp:	Σ^+
980	PAQqc:	$\overline{q}_c$	1023	PGSz:	Σ^0
981	PAQqd:	$\overline{q}_d$	1024	PGSstm:	Σ^{*-}
982	PAQqs:	$\overline{q}_s$	1025	PGSstp:	Σ^{*+}
983	PAQqt:	$\overline{q}_t$	1026	PGSstz:	Σ^{*0}
984	PAQqtpr:	$\overline{q}_{t'}$	1027	PGSP{x}:	$\Sigma(x)$
985	PAQqu:	$\overline{q}_u$	1028	PGSmP{x}:	$\Sigma(x)^-$
986	——— BARYONS ———		1029	PGSpP{x}:	$\Sigma(x)^+$
987	Pp:	p	1030	PGSzP{x}:	$\Sigma(x)^0$
988	Pn:	n	1031	PGSc:	Σ_c
989	PAp:	$\overline{p}$	1032	PGSppc:	Σ_c^{++}
990	PAn:	$\overline{n}$	1033	PGSpc:	Σ_c^+
991	PGa:	α	1034	PGSzc:	Σ_c^0
992	PN:	N	1035	PGScP{x}:	$\Sigma_c(x)$
993	PNp:	N^+	1036	PGSppcP{x}:	$\Sigma_c(x)^{++}$
994	PNz:	N^0	1037	PGSpcP{x}:	$\Sigma_c(x)^+$
995	PNP{x}:	$N(x)$	1038	PGSzcP{x}:	$\Sigma_c(x)^0$
996	PNpP{x}:	$N(x)^+$	1039	PGSstc:	Σ_c^*
997	PNzP{x}:	$N(x)^-$	1040	PGSstppc:	Σ_c^{*++}
998	PGD:	Δ			
999	PGDpp:	Δ^{++}			

1041	PGSstpc:	Σ_c^{*+}
1042	PGSstzc:	Σ_c^{*0}
1043	PGSstcP{x}:	$\Sigma_c^*(x)$
1044	PGSstppcP{x}:	$\Sigma_c^*(x)^{++}$
1045	PGSstpcP{x}:	$\Sigma_c^*(x)^+$
1046	PGSstzcP{x}:	$\Sigma_c^*(x)^0$
1047	PGSb:	Σ_b
1048	PGSmb:	Σ_b^-
1049	PGSpb:	Σ_b^+
1050	PGSzb:	Σ_b^0
1051	PGSstb:	Σ_b^*
1052	PGSstmb:	Σ_b^{*-}
1053	PGSstpb:	Σ_b^{*+}
1054	PGSstzb:	Σ_b^{*0}
1055	PGX:	Ξ
1056	PAGX:	$\overline{\Xi}$
1057	PGXm:	Ξ^-
1058	PGXz:	Ξ^0
1059	PGXstm:	Ξ^{*-}
1060	PGXstz:	Ξ^{*0}
1061	PGXP{x}:	$\Xi(x)$
1062	PGXmP{x}:	$\Xi(x)^-$
1063	PGXzP{x}:	$\Xi(x)^0$
1064	PGXstmP{x}:	$\Xi^*(x)^-$
1065	PGXstzP{x}:	$\Xi^*(x)^0$
1066	PGXc:	Ξ_c
1067	PGXpc:	Ξ_c^+
1068	PGXzc:	Ξ_c^0
1069	PGXcP{x}:	$\Xi_c(x)$
1070	PGXprc:	Ξ_c'
1071	PGXprpc:	$\Xi_c'^+$
1072	PGXprzc:	$\Xi_c'^0$
1073	PGXstc:	Ξ_c^*
1074	PGXstpc:	Ξ_c^{*+}
1075	PGXstzc:	Ξ_c^{*0}
1076	PGXcc:	Ξ_{cc}
1077	PGXpcc:	Ξ_{cc}^+
1078	PGXppcc:	Ξ_{cc}^{++}
1079	PGXstcc:	Ξ_{cc}^{*+}
1080	PGXstpcc:	Ξ_{cc}^{*+}
1081	PGXstppcc:	Ξ_{cc}^{*++}
1082	PGXb:	Ξ_b
1083	PGXmb:	Ξ_b^-
1084	PGXzb:	Ξ_b^0
1085	PGXprb:	Ξ_b'
1086	PGXprmb:	$\Xi_b'^-$
1087	PGXprzb:	$\Xi_b'^0$
1088	PGXstb:	Ξ_b^*
1089	PGXstmb:	Ξ_b^{*-}
1090	PGXstzb:	Ξ_b^{*0}
1091	PGXbc:	Ξ_{bc}
1092	PGXpbc:	Ξ_{bc}^+
1093	PGXzbc:	Ξ_{bc}^0
1094	PGXprbc:	Ξ_{bc}'
1095	PGXprpbc:	$\Xi_{bc}'^+$
1096	PGXprzbc:	$\Xi_{bc}'^0$
1097	PGXstbc:	Ξ_{bc}^*
1098	PGXstpbc:	Ξ_{bc}^{*+}
1099	PGXstzbc:	Ξ_{bc}^{*0}
1100	PGXbb:	Ξ_{bb}
1101	PGXmbb:	Ξ_{bb}^-
1102	PGXzbb:	Ξ_{bb}^0
1103	PGXstbb:	Ξ_{bb}^*
1104	PGXstmbb:	Ξ_{bb}^{*-}
1105	PGXstzbb:	Ξ_{bb}^{*0}
1106	PGO:	Ω
1107	PAGO:	$\overline{\Omega}$
1108	PGOm:	Ω^-
1109	PGOP{x}:	$\Omega(x)$
1110	PGOmP{x}:	$\Omega(x)^-$
1111	PGOc:	Ω_c
1112	PGOzc:	Ω_c^0
1113	PGOstc:	Ω_c^*
1114	PGOstzc:	Ω_c^{*0}
1115	PGOcc:	Ω_{cc}
1116	PGOpcc:	Ω_{cc}^+
1117	PGOstcc:	Ω_{cc}^*
1118	PGOstpcc:	Ω_{cc}^{*+}
1119	PGOccc:	Ω_{ccc}
1120	PGOppccc:	Ω_{ccc}^{++}
1121	PGOb:	Ω_b
1122	PGOmb:	Ω_b^-

1123	PGOstb:	Ω_b^*
1124	PGOstmb:	Ω_b^{*-}
1125	PGObc:	Ω_{bc}
1126	PGOzbc:	Ω_{bc}^0
1127	PGOprbc:	Ω_{bc}'
1128	PGOprzbc:	$\Omega_{bc}'^0$
1129	PGOstbc:	Ω_{bc}^*
1130	PGOstzbc:	Ω_{bc}^{*0}
1131	PGObcc:	Ω_{bcc}
1132	PGOpbcc:	Ω_{bcc}^+
1133	PGOstbcc:	Ω_{bcc}^*
1134	PGOstpbcc:	Ω_{bcc}^{*+}
1135	PGObb:	Ω_{bb}
1136	PGOmbb:	Ω_{bb}^-
1137	PGOstbb:	Ω_{bb}^*
1138	PGOstmbb:	Ω_{bb}^{*-}
1139	PGObbc:	Ω_{bbc}
1140	PGOzbbc:	Ω_{bbc}^0
1141	PGOstbbc:	Ω_{bbc}^*
1142	PGOstzbbc:	Ω_{bbc}^{*0}
1143	PGObbb:	Ω_{bbb}
1144	PGOmbbb:	Ω_{bbb}^-

————————— PENTAQUARKS —————————

1146	PGT:	Θ
1147	PGTp:	Θ^+
1148	PGF:	Φ
1149	PGFmm:	Φ^{--}

————————— MESONS —————————

1151	PGp:	π
1152	PGppm:	$\pi^\pm$
1153	PGpmp:	$\pi^\mp$
1154	PGpm:	π^-
1155	PGpp:	π^+
1156	PGpz:	π^0
1157	PGpP{x}:	$\pi(x)$
1158	PGppP{x}:	$\pi^+(x)$
1159	PGpzP{x}:	$\pi^0(x)$
1160	PGpDoP{x}:	$\pi_1(x)$
1161	PGppDoP{x}:	$\pi_1^+(x)$
1162	PGpzDoP{x}:	$\pi_1^0(x)$
1163	PGpDtP{x}:	$\pi_2(x)$
1164	PGppDtP{x}:	$\pi_2^+(x)$

1165	PGpzDtP{x}:	$\pi_2^0(x)$
1166	PGh:	η
1167	PGhpr:	η'
1168	PGhP{x}:	$\eta(x)$
1169	PGhprP{x}:	$\eta'(x)$
1170	PGhDtP{x}:	$\eta_2(x)$
1171	Pf:	f
1172	PfDzP{x}:	$f_0(x)$
1173	PfDoP{x}:	$f_1(x)$
1174	PfDtP{x}:	$f_2(x)$
1175	PfprDtP{x}:	$f_2'(x)$
1176	PfDfP{x}:	$f_4(x)$
1177	PfDsP{x}:	$f_6(x)$
1178	PfJP{x}:	$f_J(x)$
1179	PGr:	ρ
1180	PGrP{x}:	$\rho(x)$
1181	PGrpP{x}:	$\rho^+(x)$
1182	PGrzP{x}:	$\rho^0(x)$
1183	PGrDTP{x}:	$\rho_3(x)$
1184	PGrpDTP{x}:	$\rho_3^+(x)$
1185	PGrzDTP{x}:	$\rho_3^0(x)$
1186	PGrDFP{x}:	$\rho_5(x)$
1187	PGrpDFP{x}:	$\rho_5^+(x)$
1188	PGrzDFP{x}:	$\rho_5^0(x)$
1189	PGo:	ω
1190	PGoP{x}:	$\omega(x)$
1191	PGoDTP{x}:	$\omega_3(x)$
1192	Pa:	a
1193	PaDzP{x}:	$a_0(x)$
1194	PapDzP{x}:	$a_0^+(x)$
1195	PazDzP{x}:	$a_0^0(x)$
1196	PaDoP{x}:	$a_1(x)$
1197	PapDoP{x}:	$a_1^+(x)$
1198	PazDoP{x}:	$a_1^0(x)$
1199	PaDtP{x}:	$a_2(x)$
1200	PapDtP{x}:	$a_2^+(x)$
1201	PazDtP{x}:	$a_2^0(x)$
1202	PaDfP{x}:	$a_4(x)$
1203	PapDfP{x}:	$a_4^+(x)$
1204	PazDfP{x}:	$a_4^0(x)$
1205	PaDsP{x}:	$a_6(x)$

1206	PapDsP{x}:	$a_6^+(x)$
1207	PazDsP{x}:	$a_6^0(x)$
1208	PGf:	ϕ
1209	PGfP{x}:	$\phi(x)$
1210	PGfDTP{x}:	$\phi_3(x)$
1211	Ph:	h
1212	PhDoP{x}:	$h_1(x)$
1213	Pb:	b
1214	PbDoP{x}:	$b_1(x)$
1215	PbpDoP{x}:	$b_1^+(x)$
1216	PbzDoP{x}:	$b_1^0(x)$
1217	————Strange (S=±1,C=B=0) ————		
1218	PK:	K
1219	PKpm:	$K^\pm$
1220	PKmp:	$K^\mp$
1221	PKm:	K^-
1222	PKp:	K^+
1223	PKL:	K_L
1224	PKS:	K_S
1225	PKz:	K^0
1226	PKzL:	K_L^0
1227	PKzS:	K_S^0
1228	PKst:	K^*
1229	PAK:	$\overline{K}$
1230	PAKst:	$\overline{K}^*$
1231	PAKz:	$\overline{K}^0$
1232	PKP{x}:	$K(x)$
1233	PKDzP{x}:	$K_0(x)$
1234	PKDoP{x}:	$K_1(x)$
1235	PKDtP{x}:	$K_2(x)$
1236	PKDTP{x}:	$K_3(x)$
1237	PKDfP{x}:	$K_4(x)$
1238	PKstP{x}:	$K^*(x)$
1239	PKstDzP{x}:	$K_0^*(x)$
1240	PKstDoP{x}:	$K_1^*(x)$
1241	PKstDtP{x}:	$K_2^*(x)$
1242	PKstDTP{x}:	$K_3^*(x)$
1243	PKstDfP{x}:	$K_4^*(x)$
1244	PKstDFP{x}:	$K_5^*(x)$
1245	PKeiii:	K_{e3}
1246	PKgmiii:	$K_{\mu3}$
1247	PKzeiii:	K_{e3}^0

1248	PKzgmiii:	$K_{\mu3}^0$
1249	————Charmed (C=±1) ————		
1250	PD:	D
1251	PDpm:	$D^\pm$
1252	PDmp:	$D^\mp$
1253	PDz:	D^0
1254	PDm:	D^-
1255	PDp:	D^+
1256	PDst:	D^*
1257	PDstm:	D^{*-}
1258	PDstp:	D^{*+}
1259	PDstpm:	$D^{*\pm}$
1260	PAD:	$\overline{D}$
1261	PADz:	$\overline{D}^0$
1262	PDstzP{x}:	$D^*(x)^0$
1263	PDstpmP{x}:	$D^*(x)^\pm$
1264	PDstmP{x}:	$D^*(x)^-$
1265	PDstpP{x}:	$D^*(x)^+$
1266	PDzDoP{x}:	$D_1(x)^0$
1267	PDpmDoP{x}:	$D_1(x)^\pm$
1268	PDmDoP{x}:	$D_1(x)^-$
1269	PDpDoP{x}:	$D_1(x)^+$
1270	PDstzDtP{x}:	$D_2^*(x)^0$
1271	PDstpmDtP{x}:	$D_2^*(x)^\pm$
1272	PDstmDtP{x}:	$D_2^*(x)^-$
1273	PDstpDtP{x}:	$D_2^*(x)^+$
1274	——Charmed, generic quarks (B=±1) ——		
1275	PDq:	D_q
1276	PDzq:	D_q^0
1277	PADq:	$\overline{D}_q$
1278	PADzq:	$\overline{D}_q^0$
1279	————Charmed, strange (C=S=±1) ————		
1280	PDs:	D_s
1281	PDms:	D_s^-
1282	PDps:	D_s^+
1283	PDpms:	$D_s^\pm$
1284	PDstms:	D_s^{*-}
1285	PDstps:	D_s^{*+}
1286	PDstpms:	$D_s^{*\pm}$
1287	PDstpmsJP{x}:	$D_{sJ}^*(x)^\pm$
1288	PDstmsJP{x}:	$D_{sJ}^*(x)^-$

1289	PDstpsJP{x}:	$D_{sJ}^*(x)^+$
1290	PDpmsJP{x}:	$D_{sJ}(x)^\pm$
1291	PDmsJP{x}:	$D_{sJ}(x)^-$
1292	PDpsJP{x}:	$D_{sJ}(x)^+$
1293	PDpmsDoP{x}:	$D_{s1}(x)^\pm$
1294	PDmsDoP{x}:	$D_{s1}(x)^-$
1295	PDpsDoP{x}:	$D_{s1}(x)^+$
1296	PDpmsDtP{x}:	$D_{s2}(x)^\pm$
1297	PDmsDtP{x}:	$D_{s2}(x)^-$
1298	PDpsDtP{x}:	$D_{s2}(x)^+$
1299	————————Bottom (B=±1)————————	
1300	PB:	B
1301	PBpm:	$B^\pm$
1302	PBp:	B^+
1303	PBm:	B^-
1304	PBz:	B^0
1305	PBst:	B^*
1306	PBstp:	B^{*+}
1307	PBstz:	B^{*0}
1308	PBstDz:	B_0^*
1309	PBstpDz:	B_0^{*+}
1310	PBstzDz:	B_0^{*0}
1311	PBstDo:	B_1^*
1312	PBstpDo:	B_1^{*+}
1313	PBstzDo:	B_1^{*0}
1314	PBstDt:	B_2^*
1315	PBstpDt:	B_2^{*+}
1316	PBstzDt:	B_2^{*0}
1317	PAB:	$\overline{B}$
1318	PABz:	$\overline{B}^0$
1319	PBstJP{x}:	$B_J^*(x)$
1320	PBstpJP{x}:	$B_J^*(x)^+$
1321	PBstzJP{x}:	$B_J^*(x)^0$
1322	PBDoP{x}:	$B_1(x)$
1323	PBpDoP{x}:	$B_1(x)^+$
1324	PBzDoP{x}:	$B_1(x)^0$
1325	————Bottom, strange (B=±1,S=-+1)————	
1326	PBs:	B_s
1327	PBzs:	B_s^0
1328	PABs:	$\overline{B}_s$
1329	PABzs:	$\overline{B}_s^0$
1330	PBsts:	B_s^*
1331	PBstzs:	B_s^{*0}
1332	PBstsDz:	B_{s0}^*
1333	PBstzsDz:	B_{s0}^{*0}
1334	PBstsDo:	B_{s1}^*
1335	PBstzsDo:	B_{s1}^{*0}
1336	PBstsDt:	B_{s2}^*
1337	PBstzsDt:	B_{s2}^{*0}
1338	PBstsJP{x}:	$B_{sJ}^*(x)$
1339	PBstzsJP{x}:	$B_{sJ}^*(x)^0$
1340	PBsDoP{x}:	$B_{s1}(x)$
1341	PBzsDoP{x}:	$B_{s1}(x)^0$
1342	————Bottom, generic quarks (B=±1)————	
1343	PBq:	B_q
1344	PBzq:	B_q^0
1345	PABq:	$\overline{B}_q$
1346	PABzq:	$\overline{B}_q^0$
1347	————Bottom, down (B=±1,S=0)————	
1348	PBd:	B_d
1349	PBzd:	B_d^0
1350	PABd:	$\overline{B}_d$
1351	PABzd:	$\overline{B}_d^0$
1352	————Bottom, up (B=±1,S=0)————	
1353	PBu:	B_u
1354	PBzu:	B_u^0
1355	PABu:	$\overline{B}_u$
1356	PABzu:	$\overline{B}_u^0$
1357	————Bottom, charmed (B=C=±1)————	
1358	PBc:	B_c
1359	PBmc:	B_c^-
1360	PBpc:	B_c^+
1361	PBpmc:	$B_c^\pm$
1362	PBstc:	B_c^*
1363	PBstpc:	B_c^{*+}
1364	PBstcDz:	B_{c0}^*
1365	PBstpcDz:	B_{c0}^{*+}
1366	PBstcDo:	B_{c1}^*
1367	PBstpcDo:	B_{c1}^{*+}
1368	PBstcDt:	B_{c2}^*
1369	PBstpcDt:	B_{c2}^{*+}
1370	PBcDoP{x}:	$B_{c1}(x)$
1371	PBpcDoP{x}:	$B_{c1}(x)^+$

1372		————charm/anticharm————
1373	PGhc:	η_c
1374	PGhcP{x}:	$\eta_c(x)$
1375	PJGy:	J/ψ
1376	PJGyP{x}:	$J/\psi(x)$
1377	PGy:	ψ
1378	PGyP{x}:	$\psi(x)$
1379	PGc:	χ
1380	PGcc:	χ_c
1381	PGccDzP{x}:	$\chi_{c0}(x)$
1382	PGccDoP{x}:	$\chi_{c1}(x)$
1383	PGccDtP{x}:	$\chi_{c2}(x)$
1384	Phc:	h_c
1385	PhcP{x}:	$h_c(x)$
1386	PX:	X
1387	PXP{x}:	$X(x)$
1388		————bottom/antibottom————
1389	PGhb:	η_b
1390	PGhbP{x}:	$\eta_b(x)$
1391	PGU:	Υ
1392	PGUP{x}:	$\Upsilon(x)$
1393	PGUpr:	Υ'
1394	PGUprpr:	Υ''
1395	PGUprprpr:	Υ'''
1396	PGUprprprpr:	Υ''''
1397	PGcb:	χ_b
1398	PGcbDzP{x}:	$\chi_{b0}(x)$
1399	PGcbDoP{x}:	$\chi_{b1}(x)$
1400	PGcbDtP{x}:	$\chi_{b2}(x)$
1401		————SUSY particles————
1402	PSH:	H
1403	PSHpm:	$H^{\pm}$
1404	PSHp:	H^+
1405	PSHm:	H^-
1406	PSHpmpm:	$H^{\pm\pm}$
1407	PSHpp:	H^{++}
1408	PSHmm:	H^{--}
1409	PSh:	h
1410	PShz:	h^0
1411	PSA:	A
1412	PSAz:	A^0
1413	PSHzDo:	H_1^0
1414	PSHzDt:	H_2^0
1415	PSHzDT:	H_3^0
1416	PSGg:	$\widetilde{\gamma}$
1417	PSg:	$\widetilde{g}$
1418	PSW:	$\widetilde{W}$
1419	PSWm:	$\widetilde{W}^-$
1420	PSWp:	$\widetilde{W}^+$
1421	PSWpm:	$\widetilde{W}^{\pm}$
1422	PSZ:	$\widetilde{Z}$
1423	PSZz:	$\widetilde{Z}^0$
1424	PSGc:	$\widetilde{\chi}$
1425	PSGcz:	$\widetilde{\chi}^0$
1426	PSGczDo:	$\widetilde{\chi}_1^0$
1427	PSGczDt:	$\widetilde{\chi}_2^0$
1428	PSGczDT:	$\widetilde{\chi}_3^0$
1429	PSGczDf:	$\widetilde{\chi}_4^0$
1430	PSGcm:	$\widetilde{\chi}^-$
1431	PSGcp:	$\widetilde{\chi}^+$
1432	PSGcpm:	$\widetilde{\chi}^{\pm}$
1433	PSGcmDo:	$\widetilde{\chi}_1^-$
1434	PSGcpDo:	$\widetilde{\chi}_1^+$
1435	PSGcpmDo:	$\widetilde{\chi}_1^{\pm}$
1436	PSGcmDt:	$\widetilde{\chi}_2^-$
1437	PSGcpDt:	$\widetilde{\chi}_2^+$
1438	PSGcpmDt:	$\widetilde{\chi}_2^{\pm}$
1439	PSl:	$\widetilde{l}$
1440	PASl:	$\widetilde{\bar{l}}$
1441	PSlL:	$\widetilde{l}_L$
1442	PSlR:	$\widetilde{l}_R$
1443	PSe:	$\widetilde{e}$
1444	PSemL:	$\widetilde{e}_L^-$
1445	PSemR:	$\widetilde{e}_R^-$
1446	PSeL:	$\widetilde{e}_L$
1447	PSeR:	$\widetilde{e}_R$
1448	PSGm:	$\widetilde{\mu}$
1449	PSGmmL:	$\widetilde{\mu}_L^-$
1450	PSGmmR:	$\widetilde{\mu}_R^-$
1451	PSGmL:	$\widetilde{\mu}_L$
1452	PSGmR:	$\widetilde{\mu}_R$
1453	PSGt:	$\widetilde{\tau}$
1454	PSGtmDo:	$\widetilde{\tau}_1^-$

1455	PSGtmDt:	$\widetilde{\tau}_2^-$
1456	PSGtL:	$\widetilde{\tau}_L$
1457	PSGtR:	$\widetilde{\tau}_R$
1458	PSGtDo:	$\widetilde{\tau}_1$
1459	PSGtDt:	$\widetilde{\tau}_2$
1460	PSGn:	$\widetilde{\nu}$
1461	PASGn:	$\widetilde{\widetilde{\nu}}$
1462	PSGne:	$\widetilde{\nu}_e$
1463	PSGneL:	$\widetilde{\nu}_{eL}$
1464	PSGneR:	$\widetilde{\nu}_{eR}$
1465	PSGnGm:	$\widetilde{\nu}_\mu$
1466	PSGnGmL:	$\widetilde{\nu}_{\mu L}$
1467	PSGnGmR:	$\widetilde{\nu}_{\mu R}$
1468	PSGnGt:	$\widetilde{\nu}_\tau$
1469	PSGnGtDo:	$\widetilde{\nu}_{\tau 1}$
1470	PSGnGtDt:	$\widetilde{\nu}_{\tau 2}$
1471	PSQ:	$\widetilde{q}$
1472	PSQL:	$\widetilde{q}_L$
1473	PSQR:	$\widetilde{q}_R$
1474	PSQd:	$\widetilde{d}$
1475	PSQdL:	$\widetilde{d}_L$
1476	PSQdR:	$\widetilde{d}_R$
1477	PSQu:	$\widetilde{u}$
1478	PSQuL:	$\widetilde{u}_L$
1479	PSQuR:	$\widetilde{u}_R$
1480	PSQs:	$\widetilde{s}$
1481	PSQsL:	$\widetilde{s}_L$
1482	PSQsR:	$\widetilde{s}_R$
1483	PSQc:	$\widetilde{c}$
1484	PSQcL:	$\widetilde{c}_L$
1485	PSQcR:	$\widetilde{c}_R$
1486	PSQb:	$\widetilde{b}$
1487	PSQbL:	$\widetilde{b}_L$
1488	PSQbR:	$\widetilde{b}_R$
1489	PSQbDo:	$\widetilde{b}_1$
1490	PSQbDt:	$\widetilde{b}_2$
1491	PSQt:	$\widetilde{t}$
1492	PSQtL:	$\widetilde{t}_L$
1493	PSQtR:	$\widetilde{t}_R$
1494	PSQtDo:	$\widetilde{t}_1$
1495	PSQtDt:	$\widetilde{t}_2$
1496	PASQ:	$\widetilde{\widetilde{q}}$
1497	PASQL:	$\widetilde{\widetilde{q}}_L$
1498	PASQR:	$\widetilde{\widetilde{q}}_R$
1499	PASQd:	$\widetilde{\widetilde{d}}$
1500	PASQdL:	$\widetilde{\widetilde{d}}_L$
1501	PASQdR:	$\widetilde{\widetilde{d}}_R$
1502	PASQu:	$\widetilde{\widetilde{u}}$
1503	PASQuL:	$\widetilde{\widetilde{u}}_L$
1504	PASQuR:	$\widetilde{\widetilde{u}}_R$
1505	PASQs:	$\widetilde{\widetilde{s}}$
1506	PASQsL:	$\widetilde{\widetilde{s}}_L$
1507	PASQsR:	$\widetilde{\widetilde{s}}_R$
1508	PASQc:	$\widetilde{\widetilde{c}}$
1509	PASQcL:	$\widetilde{\widetilde{c}}_L$
1510	PASQcR:	$\widetilde{\widetilde{c}}_R$
1511	PASQb:	$\widetilde{\widetilde{b}}$
1512	PASQbL:	$\widetilde{\widetilde{b}}_L$
1513	PASQbR:	$\widetilde{\widetilde{b}}_R$
1514	PASQbDo:	$\widetilde{\widetilde{b}}_1$
1515	PASQbDt:	$\widetilde{\widetilde{b}}_2$
1516	PASQt:	$\widetilde{\widetilde{t}}$
1517	PASQtL:	$\widetilde{\widetilde{t}}_L$
1518	PASQtR:	$\widetilde{\widetilde{t}}_R$
1519	PASQtDo:	$\widetilde{\widetilde{t}}_1$
1520	PASQtDt:	$\widetilde{\widetilde{t}}_2$
1521	———Random things———	
1522	PEz:	E^0
1523	PgA:	g_A^0
1524	PXXA:	A
1525	PXXAz:	A^0
1526	PXXG:	G
1527	PXXSG:	$\widetilde{G}$