The HEP-PAPER package∗
Publications in high energy physics
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Abstract
The HEP-PAPER package aims to provide a single style file containing most configurations and macros necessary to write appealing publications in High Energy Physics. Instead of reinventing the wheel by introducing newly created macros HEP-PAPER preferably loads third party packages.

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1 Introduction

For usual publications it is enough to load additionally to the article class without optional arguments only the hep-paper package [1].

\documentclass{article}
\usepackage{hep-paper}

The most notable changes after loading the hep-paper package is the change of some LATEX defaults. The paper and font sizes are set to A4 and 11 pt, respectively. Additionally, the paper geometry is adjusted using the geometry package [2]. Furthermore, the font is changed to latin modern using the hep-font package [3]. Finally, portable document format (PDF) hyperlinks are implemented with the hyperref package [4].

1.1 Options

- **paper**: The paper=(format) option loads the specified paper format. The possible formats are: a0, a1, a2, a3, a4, a5, a6, b0, b1, b2, b3, b4, b5, b6, c0, c1, c2, c3, c4, c5, c6, ansia, ansib, ansc, ansd, ansie, letter, executive, legal. The default is a4.

- **font**: The font=(size) option loads the specified font size. The possible sizes are: 8pt, 9pt, 10pt, 11pt, 12pt, 14pt, 17pt, 20pt. The default is 11 pt.

- **lang**: The lang=(name) option switches the document language. The default is british.

- **sansserif**: The sansserif option switches the document including math to sans serif font shape.

- **oldstyle**: The oldstyle option activates the use of oldstyle text- (123) in favour of lining-text (123) figures in text mode.

- **parskip**: The parskip option changes how paragraphs are separated from each other using the parskip package [5]. The LATEX default is separation via indentation the parskip option switches to separation via vertical space.\(^1\)

- **symbols**: The symbols=(family) is passed to the hep-math-font package [6] and sets the family of the symbol fonts. symbols=false deactivates loading any additional symbol fonts.

1.1.1 Deactivation

The hep-paper package loads few bigger packages which have a large impact on the document. The deactivation options can prevent such and other adjustments.

- **defaults**: The defaults option prevents the adjustment of the page geometry and the font size set by the document class.

- **title**: The title=false option deactivates the title page adjustments.

- **bibliography**: The bibliography=(key) option prevents the automatic loading of the hep-bibliography package [7] if (key)=false.

\(^1\) Although the parskip option is used for this document, it is recommended only for very few document types such as technical manuals or answers to referees.
The `glossaries=false` option deactivates acronyms and the use of the `hep-acronym` package [8].

The `references=false` option prevents the `cleveref` package [9] from being loaded and deactivates further redefinitions of reference macros.

### 1.1.2 Compatibility

The compatibility options activate the compatibility mode for certain classes and packages used for publications in high energy physics. They are mostly suitable combinations of options described in the previous section. If `hep-paper` is able to detect the presence of such a class or package, \textit{i.e.} if it is loaded before the `hep-paper` package, the compatibility mode is activated automatically.

- **beamer** The `beamer` option activates the BEAMER [10] compatibility mode.
- **jcap** The `jcap` option activates the JCAP [12] compatibility mode.
- **revtex** The `revtex` option activates the REVTEX [13] compatibility mode.
- **pos** The `pos` option activates the PoS compatibility mode.
- **springer** The `springer` option activates the compatibility mode the `svjour` class [14].

### 1.1.3 Reactivation

The `hep-paper` package deactivates unrecommended macros, which can be reactivated manually.

- **manualplacement** The `manualplacement` option reactivates manual float placement.
- **eqnarray** The `eqnarray` option reactivates the depreciated `eqnarray` environment.

### 2 Macros and environments

**twocolumn** If the global `twocolumn` option is present the page geometry is changed to cover almost the entire page. Additionally the `abstract*` environment is defined that generates a one column abstract and takes care of placing the title information.

#### 2.1 Title page

- **series** The \texttt{\series\{\texttt{series}\}} macro is defined using the `hep-title` package [15].
- **title** The PDF meta information is set according to the \texttt{\title\{\texttt{\text\{text\}}\}} and \texttt{\author\{\texttt{(text)}\}} information.
- **subtitle** The \texttt{\subtitle\{\texttt{subtitle}\}} macro is defined.
- **editor** The following lines add \textit{e.g.} two authors with different affiliations

```latex
\affiliation
\email
```
The \preprint{⟨numer⟩} macro places a pre-print number in the upper right corner of the title page.

The abstract environment is adjusted to not start with an indentation.

Various title font macros are defined, allowing to change the appearance of the \maketitle output.

2.2 Text

The inlinelist and enumdescript environments are defined.

A bold versions \textsc{Small Caps} and a sans serif version of \textsc{Small Caps} is provided.

The \underline macro is redefined to allow line-breaks. The \overline macro is extended to also overline text outside of math environments.

If the parskip option is activated the \useparindent macro switches to the usual parindent mode, while the \useparskip macro switches to the parskip mode.

2.2.1 References and footnotes

References are extended with the cleveref package \cite{nine}, which allows to e.g. just type \cref{⟨key⟩} in order to write ‘figure 1’. Furthermore, the cleveref package allows to reference multiple objects within one \cref{⟨key1, key2⟩}.

\cite Citations are adjusted to not start on a new line in order to avoid the repeated use of ~\cite{⟨key⟩}.

\ref References are also adjusted to not start on a new line.

Footnotes are adjusted to swallow white space before the footnote mark and at the beginning of the footnote text.

2.2.2 Acronyms

The \textsc{hep-acronym} package \cite{eight} is loaded. The \acronym{⟨*⟩}{⟨typeset abbreviation⟩}{⟨abbreviation⟩}{⟨*⟩}{⟨definition⟩}{⟨plural definition⟩} macro generates the singular \langle abbreviation⟩ and plural \langle abbreviation⟩s macros. The first star prevents the addition of an ‘s’ to the abbreviation plural. The second star restores the \TeX default of swallowing subsequent white space. The long form is only shown at the first appearance of these macros, later appearances generate the abbreviation with a hyperlink to the long form. The long form is never used in math mode. Capitalization at the beginning of paragraphs and sentences is (mostly) ensured. The \textsc{shortacronym} and \textsc{longacronym} macros are drop-in replacements of the \acronym macro showing only the short or long form of their acronym.
2.3 Math

The \texttt{hep-math} [16] and \texttt{hep-math-font} [6] packages are loaded. Bold math, via \texttt{\textbf{mathbf}} is improved, \textit{i.e.} \texttt{(AbΓδAbΓδ)}. Macros switching to \texttt{bfseries} such as \texttt{\textbf{mathbf}} are ensured to also typeset math in bold. The \texttt{\texttt{\textbf{mathbf}}} macro makes it possible to write text within math mode, \textit{i.e.} \texttt{(AbΓδAbΓδ)}. The math sans serif alphabet is redefined to be italic sans serif if the main text is serif and italic serif if the main text is sans serif, \textit{i.e.} \texttt{(Ab`‹Ab`‹)}. The \texttt{\textcal{mathcal}} font is \textit{i.e.} \texttt{ABCD}). The \texttt{\textscr{mathscr}} font is also available \textit{i.e.} \texttt{A BCD}). The \texttt{\textbb{mathbb}} font is adjusted depending on the \texttt{sansserif} option \textit{i.e.} \texttt{(Ah1)}. Finally, the \texttt{\textfrak{mathfrak}} font is also available \textit{i.e.} \texttt{AaBb12}).

The \texttt{\texttt{\textfrac{\textfrac{⟨number⟩}}{⟨number⟩}}} macro is accompanied by \texttt{\textnicefrac{\textnicefrac{⟨number⟩}}{⟨number⟩}}, \texttt{\textfrac{⟨number⟩}{⟨number⟩}}, and \texttt{\textnicefrac{⟨number⟩}{⟨number⟩}} leading to \texttt{1/2}, \texttt{1/2}, \texttt{1/2}, and \texttt{1/2}. Diagonal matrix \texttt{\texttt{\textdiag{diag}}} and signum \texttt{\texttt{\textsgn{sgn}}} operators are defined.

\texttt{\texttt{\textmathdef{\textmathdef}{⟨name⟩}{⟨arguments⟩}{⟨code⟩}}} macro (re-)defines macros only within math mode without changing the text mode definition.

\texttt{\texttt{\texti{i}}} and the differential \texttt{\texttt{\textd{d}}} are defined using this functionality.

\texttt{\numberwithin{section}{equation}} In order to further reduce the size the of equation counter it can be useful to wrap align environments with multiple rows in a \texttt{subequations} environment.

\texttt{\texttt{\textunit{unit}}{⟨value⟩}} The correct spacing for units, \textit{cf.} equation (1), is provided by the macro \texttt{\texttt{\textunit{unit}}{⟨value⟩}} \texttt{⟨unit⟩} which can also be used in text mode. The macro \texttt{\texttt{\textinv{inv}}{⟨power⟩}{⟨text⟩}} allows to avoid math mode also for inverse units such as \texttt{5 fb^{-1}} typeset via \texttt{\texttt{\textunit{unit}}{⟨fb⟩}}.

Greek letters are adjusted to always be italic and upright in math and text mode, respectively, using the \texttt{hep-math-font} [6] package. This allows differentiations like

\[
\sigma = 5 \text{ fb} , \quad \text{at 5 \sigma C.L.} , \quad \mu = 5 \text{ cm} , \quad l = 5 \mu \text{m} . \tag{1}
\]

Additionally, Greek letters can also be directly typed using Unicode.

The \texttt{\texttt{\textev{ev}}} package [16] provides additional macros such as

\[
\langle \phi \rangle , \quad \frac{\partial^4 f}{\partial x \partial y^2} , \quad [A, B] , \quad \mathcal{O}(x^2) , \quad x|_{0}^{\infty} , \quad \det(M) . \tag{2}
\]

The \texttt{\texttt{\textcancel{cancel}}} macro and the \texttt{\texttt{\textslashed{slashed}}} macro allow to cancel math and use the Dirac slash notation \textit{i.e.} \texttt{∂}, respectively.

A better looking over left right arrow is defined \textit{i.e.} \texttt{\overleftright{overleftright}}.
2.4 Floats

Automatic float placement is adjusted to place a single float at the top of pages and to reduce the number of float pages, using the hep-float package [17]. The most useful float placement is usually archived by placing the float in front of the paragraph it is referenced in first.

The panels environment provides sub-floats and takes as mandatory argument either the number of sub-floats (default 2) or the width of the first sub-float as fraction of the \linewidth. Within the begin[panels]{⟨vertical alignment⟩}{⟨width⟩} environment the \panel macro initiates a new sub-float. In the case that the width of the first sub-float has been given as an optional argument to the panels environment the \panel{⟨width⟩} macro takes the width of the next sub-float as mandatory argument.

The graphic{⟨width⟩}{⟨figure⟩} macro is defined, which is a wrapper for the includegraphics{⟨figure⟩} macro and takes the figure width as fraction of the \linewidth as optional argument (default 1). If the graphics are located in a sub-folder its path can be indicated by graphics{⟨subfolder⟩}.

2.5 Bibliography

The biblatex package [18] is loaded for bibliography management. The user has to add the line \bibliography{⟨my.bib⟩} to the preamble of the document and \printbibliography at the end of the document. The bibliography is generated by Biber [19]. biblatex is extended by the hep-bibliography package [7] to be able to cope with the collaboration and reportNumber fields provided by inspirehep.net and a bug in the volume number is fixed. Additionally, the PubMed IDs are recognized and arxiv.org, ctan.org, github.com, gitlab.com, bitbucket.org, launchpad.net, sourceforge.net, and hepforge.org are valid eprinttypes. Errata can be included using the related feature.

\article{key1, ...
  relatedtype="erratum",
  related="key2",
}
\article{key2, ...

3 Conclusion

The hep-paper package provides a matching selection of preloaded packages and additional macros enabling the user to focus on the content instead of the layout by reducing the amount of manual tasks. The majority of the loaded packages are fairly lightweight, the others can be deactivated with package options.

arxiv-collector arxiv.org [20] requires the setup dependent bbl files instead of the original bib files,
which causes trouble if the local \texttt{\LaTeX} version differs from the one used by arXiv. The \texttt{arxiv-collector} python script \cite{collect} alleviates this problem by collecting all files necessary for publication on arXiv (including figures).

References


