The HEP-GRAPHIC package*

Plot macros

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2023/07/01

Abstract

The HEP-GRAPHIC is a convenience wrapper for the PGF/TIKZ, PGFPLOTS, and STANDALONE packages.

1 Graphic

After loading the `hep-graphic` package the PGF/TIKZ [1] and STANDALONE [2] packages are loaded and externalisation is activated. The `plot` and `feynman` options load the neccessary packages for plotting and feynman diagrams. The macro `\includetikz[`⟨*width*⟩`]{`⟨*name*⟩`}` loads `tikz` pictures.

1.1 Plot

The HEP-PLOT package loads the PGFPLOTS package [3] and applies some optimisation.

1.2 Feynman

The HEP-FEYNMAN package loads the TIKZ-FEYNMAN package [4] and applies some optimisation.

A Implementation

A.1 Graphic

<*package>

Define a hepgraphic namespace for the options using the KVOPTIONS package [5].

```
\RequirePackage{kvoptions}
\SetupKeyvalOptions{
  family=hepgraphic,
  prefix=hepgraphic@
}
```

`plot` Define the `extern` option to activate externalisation into the declared folder.

```
\DeclareStringOption{extern}[.]
```

*This document corresponds to HEP-GRAPHIC v1.0.

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`plot` Define the `plot` switch for loading plot code.

```
\DeclareBoolOption[false]{plot}
```

`feynman` Define the `feynman` switch for loading feynman code.

```
\DeclareBoolOption[false]{feynman}

\ProcessKeyvalOptions*
```

Load the HEP-PLOT and HEP-FEYNMAN packages when required.

```
\ifhepgraphic@plot\RequirePackage{hep-plot}\fi
\ifhepgraphic@feynman\RequirePackage{hep-feynman}\fi
```

Load the TIKZ package with the EXTERNAL library [1].

```
\RequirePackage{tikz}
\ifx\hepgraphic@extern\@empty\else
 \usetikzlibrary{external}
 \tikzexternalize[
%   optimize=false,
  only named=true,
 ]
 \tikzsetexternalprefix{\hepgraphic@extern/}
\fi
```

`\graphicpath` Load the STANDALONE package [2] and define the `\graphicpath` pointing to the folder with `pgf` files.

```
\RequirePackage{tikzscale}
\def\hep@graphic@path{.}
\newcommand{\graphicpath}[1]{\def\hep@graphic@path{#1}}
```

`\includetikz` Define a macro to include `tikz` figures using the XPARSE package [6].

```
\RequirePackage{xparse}
\NewDocumentCommand{\includepgf}{sO{}m}{%
 \tikzsetnextfilename{#3}%
 \IfBooleanTF{#1}{%
  \includegraphics{\hep@graphic@path/#3}%
 }{%
  \pgfplotsset{#2}
  \includegraphics[#2]{\hep@graphic@path/#3}%
 }%
}
\newcommand{\includefeynman}[1]{%
 \vcenter{\hbox{\includegraphics{\hep@graphic@path/#1}}}%
}
```

</package>

A.2 Plots

<*plot>

Load the PGF/TIKZ package [1].

```
\RequirePackage{tikz}
```

dashdotdotdotted Add new line styles.
dashdotdotdotdotted

```
\tikzset{
 dashdotdotdotted/.style={dash pattern=on 3pt off 2pt
  on \the\pgflinewidth off 2pt on \the\pgflinewidth off 2pt
  on \the\pgflinewidth off 2pt
 },
 dashdotdotdotdotted/.style={dash pattern=on 3pt off 2pt
  on \the\pgflinewidth off 2pt on \the\pgflinewidth off 2pt
  on \the\pgflinewidth off 2pt on \the\pgflinewidth off 2pt
 },
 dotdotdashed/.style={dash pattern=on 3pt off 2pt
  on 3pt off 2pt on \the\pgflinewidth off 2pt
 },
 dotdotdotdashed/.style={dash pattern=on 3pt off 2pt
  on 3pt off 2pt on 3pt off 2pt on \the\pgflinewidth off 2pt
 },
}%
```

Change thousand separator

```
\pgfkeys{/pgf/number format/.cd,1000 sep={\,}}%
```

Load the PGFPLOTS package [3] and set global options.

```
\RequirePackage{pgfplots}
\pgfplotsset{
 compat=newest,
 width=\linewidth,
 height=\linewidth,
 enlargelimits=false,
}
```

Fix glitch.

```
\pgfplotsset{
 every y tick scale label/.append style={
  inner sep=1pt,
  xshift=-1pt,
  yshift=-1pt,
 },
}
```

Set default font size

```
\pgfplotsset{
```

```
  legend style={font=\footnotesize},
  tick label style={font=\footnotesize},
  label style={font=\small},
  title style={font=\small},
  max space between ticks=30,
}
```

`three panels` Set font size three panel versions

```
\pgfplotsset{
  three panels/.style={
    legend style={font=\scriptsize},
    tick label style={font=\scriptsize},
    label style={font=\footnotesize},
    title style={font=\footnotesize},
    max space between ticks=25,
    /tikz/mark size=1.5pt,
    major tick length=1mm,
    minor tick length=0.66mm,
    every axis title shift=0pt,
  },
}
```

`colors` `line styles` `marks` `horizontal marks` `vertical marks` Create cycle lists

```
\colorlet{darkgreen}{green!50!black}
\pgfplotscreateplotcyclelist{colors}{
 blue, red, darkgreen, violet, orange, yellow!75!orange,
 brown, black
}
\pgfplotscreateplotcyclelist{line styles}{
 solid, dashed, {densely dotted, semithick}, dashdotted,
 dashdotdotted, dotdotdashed, dashdotdotdotted, dotdotdotdashed, dashdotdotdotdotted
}
\pgfplotscreateplotcyclelist{marks}{
 mark=-, mark=|, mark=Mercedes star flipped, mark=Mercedes star, mark=+,
 mark=x, mark=star, mark=asterisk, mark=10-pointed star
}
\pgfplotscreateplotcyclelist{vertical marks}{
 mark=|, mark=Mercedes star flipped, mark=Mercedes star, mark=x, mark=star,
 mark=asterisk, mark=10-pointed star
}
\pgfplotscreateplotcyclelist{horizontal marks}{
 mark=-, mark=Mercedes star flipped, mark=Mercedes star, mark=x, mark=star,
 mark=asterisk, mark=10-pointed star
}
\pgfplotscreateplotcyclelist{star marks}{
 mark=Mercedes star flipped, mark=Mercedes star, mark=x, mark=star,
 mark=asterisk, mark=10-pointed star
}
\pgfplotsset{
```

```
 cycle multiindex* list={colors\nextlist line styles},
}
```

`\cyclelistshift` Define the `\cyclelistshift` macro skiping one step in a cyclelist. Must be used in combination with `\setcounter{cyclelistshift}{0}`.

```
\newcounter{cyclelistshift}
\newcommand\cyclelistshift{
  \globaldefs=1\relax
%   \stepcounter{cyclelistshift}
  \addtocounter{cyclelistshift}{1}
  \pgfplotsset{cycle list shift=\value{cyclelistshift}}
  \globaldefs=0\relax
}
```

`rainbow` Define the `rainbow` colormap.

```
\pgfplotsset{
  colormap={rainbow}{
    color(0)=(violet); color(1)=(blue); color(2)=(darkgreen);
    color(3)=(yellow); color(4)=(orange); color(5)=(red)
  },
}
```

`legend` Set the legend style.

```
\pgfplotsset{
 legend cell align=left,
 legend style={
  at={(1,1)},
  anchor=north east,
  inner sep=1pt,
  outer sep=6pt,
  draw=none,
  fill opacity=.9,
  draw opacity=1,
  text opacity=1,
  cells={align=left},
  /tikz/every even column/.append style={column sep=.5em},
%   fill=none,
 },
}
```

`contour legend` Define basic contour legend

```
\pgfplotsset{
 contour legend/.style={
%   contour prepared={labels=false},
  colorbar sampled line,
  colorbar style={
   mark size=7pt,
```

```
    mark options={semithick},
    tickwidth=0pt,
    subtickwidth=0pt,
    },
 },
}
```

`contour legend x` Define horizontal contour legend.

```
% \usepgfplotslibrary{colormaps}
\pgfplotsset{
 contour legend x/.style={
  colorbar horizontal,
  colormap name=rainbow,
%   colormap/rainbow,
  contour legend,
  colorbar style={
   at={(0.5,1.025)},
   anchor=south,
   mark=|,
   axis x line*=top,
   axis y line=none,
   xticklabel pos=upper,
   title style={
    at={(-0.05,1)},
    anchor=east,
   },
   xlabel style={
    at={(-0.06,1)},
    anchor=south east,
   },
  },
 },
}
```

`contour legend y` Define vertical contour legend.

```
\pgfplotsset{
 contour legend y/.style={
  contour legend,
  colorbar style={
   at={(1.025,0.5)},
   anchor=west,
   mark=-,
   axis x line=none,
   title style={
    at={(1,-0.1)},
    anchor=north west,
   },
  },
 },
```

```
}
```

`contour plot x` `contour plot y` Define vertical contour legend.

```
\pgfplotsset{
 contour plot x/.style={
  contour legend x,
  contour prepared={labels=false},
 },
 contour plot y/.style={
  contour legend y,
  contour prepared={labels=false},
 },
}
```

`error legend` Define error legend.

```
\pgfplotsset{
 error legend/.style n args={3}{
  legend image code/.code={
   \draw[draw=none,fill=#1,#3](0mm,-1mm)rectangle(6mm,1mm);
   \draw[draw=#1,#2] (0mm,0mm)--(6mm,0mm);
  }
 },
}
```

`\addlegendtitle` Define a legend title macro.

```
\newcommand{\addlegendtitle}[2][]{
 \addlegendimage{empty legend}
 \addlegendentry[#1]{\hspace{-7mm}#2}
}%
```

</plot>

A.3 Feynman graphs

<*feynman>

Load TIKZ-FEYNMAN package [4] to enable the drawing of Feynman diagrams. Deactivate warning

```
\RequirePackage{tikz-feynman}
\tikzfeynmanset{
 compat=1.1.0,
 warn luatex=false,
}
\makeatletter\def\tikzfeynman@luatex@required@path{}\makeatother
```

Redfine the arrow style

```
\tikzfeynmanset{
 with arrow/.style={%
  decoration={markings,mark=at position#1with\arrow{>}},
```

```
  postaction=decorate
 },
 with reversed arrow/.style={%
  decoration={markings,mark=at position#1with\arrow{<}},
  postaction=decorate
 },
 momentum/arrow style={->},
}
```

</feynman>

B Tests

<*test>

```
\documentclass{article}

\usepackage{hep-graphic}

\begin{document}

\end{document}
```

</test>

C Readme

<*readme>

```
# The ‘hep-graphic‘ package

A ‘LaTeX‘ package for publications in High Energy Physics.

## Introduction

...

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part of all distributions of LaTeX version 2005/12/01 or later.
```

</readme>

References

[1] T. Tantau and H. Menke. 'The `pgf` package: Create PostScript and PDF graphics in TEX' (2005). CTAN: `pgf`.

[2] M. Scharrer. 'The `standalone` package: Compile TEX pictures stand-alone or as part of a document' (2010). CTAN: `standalone`.

[3] C. Feuersänger. 'The `pgfplots` package: Create normal/logarithmic plots in two and three dimensions' (2007). CTAN: `pgfplots`.

[4] J. Ellis. 'The `pgf` package: Feynman diagrams with TikZ' (2016). CTAN: `tikz-feynman`.

[5] H. Oberdiek. 'The `kvoptions` package: Key value format for package options' (2004). CTAN: `kvoptions`. GitHub: `ho-tex/kvoptions`.

[6] *LATEX3 Project*. 'The `xparse` package: A generic document command parser' (1999). CTAN: `xparse`.