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How to Include PostScript and Encapsulated PostScript Files into LaTeX

Quite often pictures generated with various sorts of graphics or scan programs need to be included into publications. The recommended way to do this at DESY is to include encapsulated PostScript (eps) files using the document style option epsfig in LaTeX. However, eps files are not always available. The picture might only be obtainable as a pure PostScript (ps) file. This document will tell you how to include both eps and ps files into your LaTeX document and what differences there are between the two sorts of graphics files.

The general layout of your LaTeX file will look like the following example:

```
\documentstyle[epsfig]{article}
\begin{document}
some text
\epsfig{file=yourpict.eps,...}
some text
\end{document}
```

The complete syntax of the epsfig command is as follows. Please observe the % sign at the end of each parameter because epsfig does not allow trailing blanks between the parameters.

```
\epsfig{%
  file=filename,%                specifies the eps file to be included
  figure=filename,%              synonym for file
  height=height<dim>,%           height of the figure
  width=width<dim>,%             width of the figure
  bbllx=bbllx<dim>,%             lower left x-coordinate of Bounding Box
  bblly=bblly<dim>,%             lower left y-coordinate of Bounding Box
  bburx=bburx<dim>,%             upper right x-coordinate of Bounding Box
  bbury=bbury<dim>,%             upper right y-coordinate of Bounding Box
  rheight=rheight<dim>,%         the reserved hight for LaTeX
  rwidth=rwidth<dim>,%           the reserved width for LaTeX
  clip=,%                        clips region outside of Bounding Box if present
  angle=angle,%                  angle of rotation in degrees
  }
```

How to Tell a PostScript from an Encapsulated PostScript File

PostScript and encapsulated PostScript files differ by a few very important details.

PostScript files are used for display or printing and therefore contain a line with the word *showpage*. This command will force the display program or printer to actually show the page on the device.

Encapsulated PostScript files are used to include them in a text using a text formatting language such as LaTeX. Since the display will be performed by the text formatter, there is **no** *showpage* command in the text. Instead, a line containing the boundary parameters is found at the top of the file. These parameters form the bounding box and would look something like this:

```
%%BoundingBox: 0 0 555 801
```

The parameters are the lower left and upper right coordinates of the picture in a dimension called points (1pt = 1/72 inch).

Usually PostScript files carry the file extension **.ps** while encapsulated PostScript file carry the extension **.eps**.

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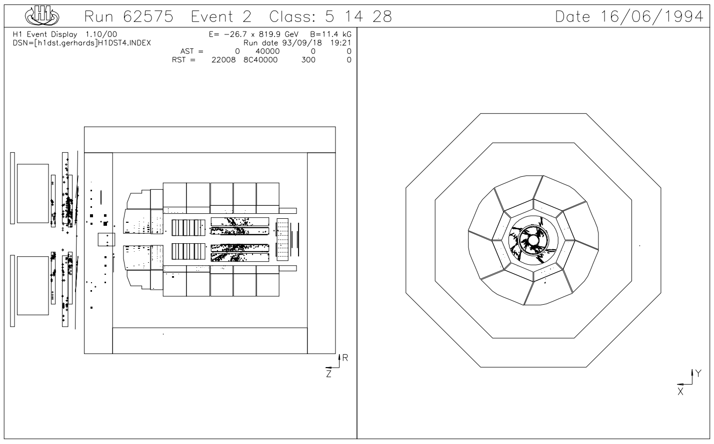
How to Print ps and eps Files

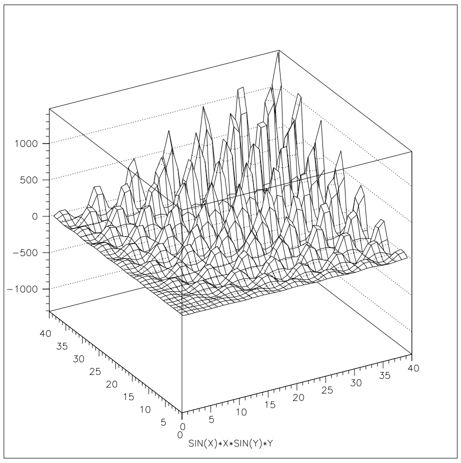
PostScript files can be printed directly from the operating system level with the command **lp** or **lpr**, while encapsulated PostScript files need the inclusion in a text (see the following examples). Sending an eps file directly to the printer with the normal print commands, lp or lpr, will result in a high network load, a consumption of cpu time on the printer, and only a coversheet with your name on it but definitely no picture! To append the *showpage* command, either the file has to be edited (the showpage command needs to be located after all drawing commands at the end of the file) or the following more complicated Unix command has to be used:
(cat *yourfile***.eps ; echo showpage) | lp**

How to Include an eps Picture in LaTeX

The example uses an event display from H1, which was produced as a landscape eps file using *look* and a *paw* plot with metafile id -113 (HIGZ/encapsulated PostScript). The inclusion is simply done with the following command:

`\epsfig{file=look.eps,width=10cm,angle=90}`   `\epsfig{file=paw.eps,width=6cm}`





How to Include a ps Picture in LaTeX

The next example is the inclusion of a PostScript file. Here the command does **not** simply look like this: \epsfig{file=look.ps,width=10cm,angle=90}. Using this command will result in the following error message:

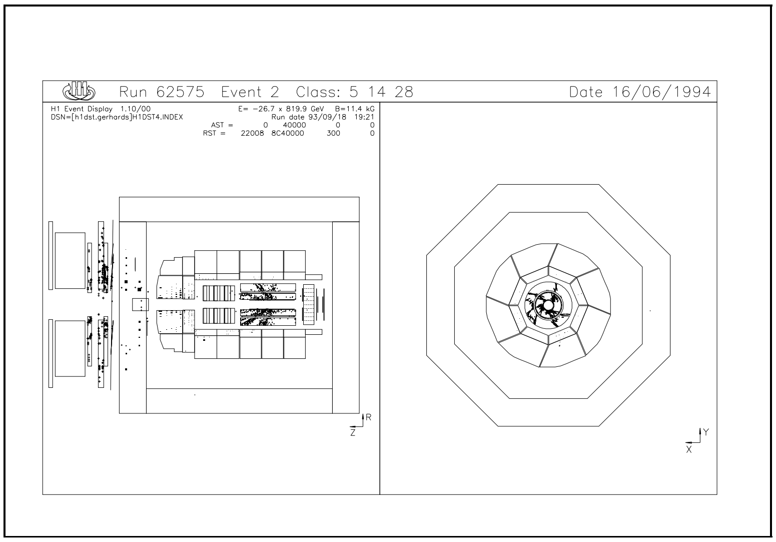
```
LaTeX error.  See LaTeX manual for explanation.
              Type  H <return>  for immediate help.
! ERROR - Cannot locate BoundingBox.
```

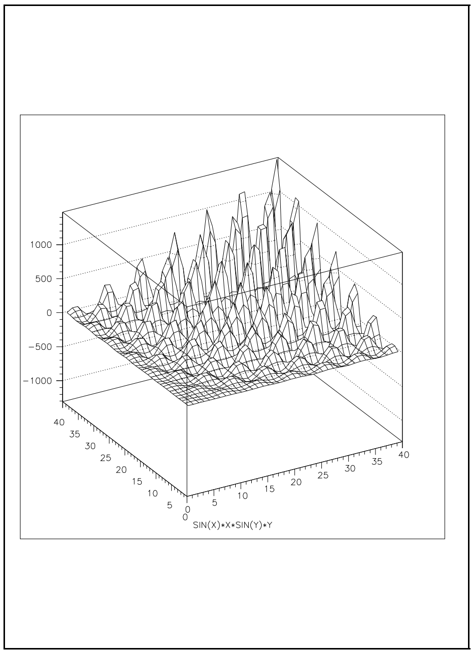
Instead the bounding box has to be specified in the command in the following way:

```
\epsfig{file=look.ps,bbllx=0pt,bblly=0pt,bburx=594pt,bbury=842pt,width=10cm,angle=90}

\epsfig{file=paw.ps,bbllx=0pt,bblly=0pt,bburx=594pt,bbury=842pt,width=6cm}
```

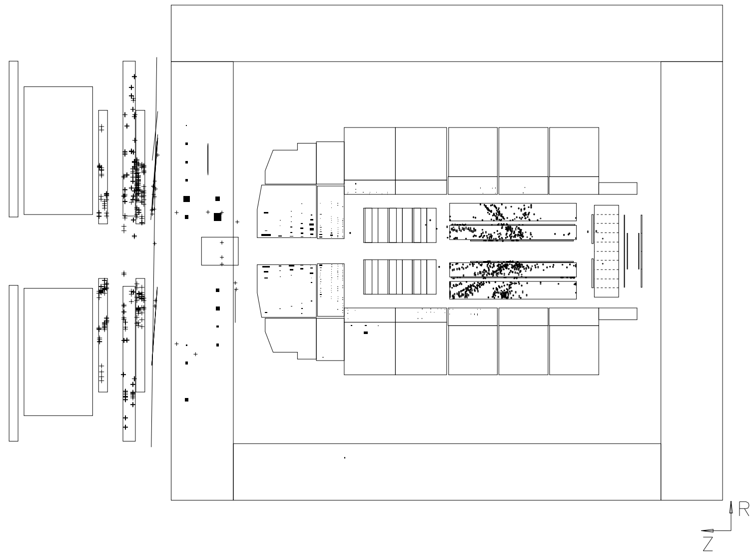
where the four bounding box (bb) parameters specify the lower left (ll) and upper right (ur) x/y coordinates of the picture. For easier visibility of extra white space, frames have been included in the following display:





To determine the parameters for the bounding box, you can either take a ruler and measure the coordinates and specify them in the measured dimension (e.g. bburx=16.3cm), or view the picture with ghostview. When you move the mouse pointer over the picture, the coordinates will simultaneously be displayed in the left upper corner of the ghostview screen below the name of the file and the date and time line: *(x, y)*. By actually measuring the bounding box parameters this way, you can move the picture to the desired place in your final document, even if the original picture would show up with large offsets or extra white space. To remove extra white space, choose your coordinates close to the picture. To remove unwanted parts of the picture, specify the *clip=* parameter, e.g. the sideview of the H1 detector can be obtained with the following command:

```
\epsfig{file=look.ps,bbllx=100pt,bblly=430pt,bburx=400pt,bbury=796pt,%
        width=10cm,angle=90,clip=}
```



How to View the Complete Document

1. Edit your LaTeX file to include the pictures and specify the documentstyle option *epsfig*.
2. Once you have included your ps or eps file in your document, you need to run LaTeX with the command *latex yourtext* or *latex yourtext*.**tex**
3. You may now view the resulting document *without* the enclosed PostScript pictures using the previewer xdvi with the following command: *xdvi yourfile* & or *xdvi yourfile*.**dvi** & (see USG documentation USG/93/03 for xdvi commands). This might be useful if you only want to view the text and see the location of the reserved white space for the picture on the page.
4. To also view the pictures, convert the output to PostScript using the dvips program: *dvips yourtext* or *dvips yourtext*.**dvi**
5. View the result with: *ghostview yourtext*.**ps** & (see USG documentation USG/93/03 for ghostview commands)

If your text or picture location need correction, you have to repeat steps 1, 2 and 4 and refresh the resulting view by activating the xdvi window (text only) or with the command **r** on the ghostview window (if you also want to see the pictures).