TeXlattice - draw accelerator lattices with LaTeX
using pgf/tikz

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1 Installation

1.1 Copy lattice.sty

You just need to copy the lattice.sty file to a place where your LaTeX installation can recognize it. This can be

- the same folder as your .tex document

- in the LaTeX system tree (e.g. for texlive under ubuntu *usr/share/texmf/tex/latex...*)

- in a LaTeX user tree

Read the documentation of your LaTeX distribution for details.

1.2 Required packages

- tikz, pgf

- siunitx

- ifthen

- xargs

2 What is missing?

- The look of the elements can definitely be improved. Feel free to do it! The only constraint is that it must be drawn as a tikz node.

- More element types can be added easily - please report what you need!

3 lattice environment

To draw a lattice just add

```
\usepackage{lattice}
```

to your preambel and use the lattice environment. the lattice environment has 4 optional arguments:

1. [tikz options] give any options for the tikzpicture (e.g. overlay)

2. [scale] scale whole picture (default: 1)

3. [label fontsize] text label fontsize (default: \normalsize)

4. [label distance] distance of text labels to elements (default: 1cm)

4 Within lattice environment

4.1 Elements

- \drift{length/m}[name (default: none)]

- \dipole{name}{length/m}{bending angle/deg}[thickness (default 8mm)]

- \quadrupole{name}{length/m}

- \sextupole{name}{length/m}

- \kicker{name}{length/m}

- \cavity{name}{length/m}

- \source{name}

- \screen{name}

- \marker{name}[length/m (default)] a line perpendicular to beamline of given length

4.2   Other commands

- \rotate{angle/deg} "bends" the beamline. e.g. to set starting angle

- \shiftlabels moves labels to other side of elements (swap with marker labels)

- \start{coordinate/m} sets starting point of lattice. use before first element coordinate in form (x,y) or any tikz label, e.g. (mylabel.east) hint: use with \savecoordinate to connect lattices! (compile twice!)

- \drawrule{start coordinate/m}{tick distance/m} a rule to visualize lattice size. coordinate in form (x,y) or any tikz label, e.g. (mylabel.east)

- \setdriftcolor{color (default black)} for all following drifts

- \setmarkercolor{color (default red)} for all following markers

- \setelementcolor{type}{color (default depends on type)} define color for one element-type

4.3   Access lattice coordinates to add sth. manually or connect lattices

- \savecoordinate{name}[position (default: east)] saves coordinate of previous element to access it later.

  - position specifies the exact place of the element (north, center, south west, . . .). Here east is always downstream and west upstream.
  - you can use all tikz/pgf commands within lattice environment to draw anything.
  - You can also connect multiple lattices. use tikz overlay option (1. argument of lattice) and \start. See example 3.
  - ! DON'T use bare numbers as names (e.g. (1)) These are the internal element identifiers.

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5   Remarks

- lengths are set in meter, so you write {1.32} for 1.32m.

- picture scale: for lattice scale=1 an element of 1m length is plotted with 2cm length

- minimum element length 0.01m (drifts can be shorter)

- maximum drift length <2.9m (just add a second drift to get a longer one)

- if you refer to a coordinate from another lattice (another tikzpicture) you have to compile twice