1 Introduction

This package is there to make it easier to make annotated equations in \LaTeX, such as in this example:

\begin{equation*}
i \hbar \frac{\partial}{\partial t} \Psi(x, t) = \hat{H} \Psi(x, t)
\end{equation*}

\hbar = \frac{h}{2\pi}, \text{ reduced Planck constant}

\text{Hamilton operator}

\text{Wave function}

There is still a bit of manual tweaking required (such as adding vertical space before/after the equation), but hopefully this package will already make it a bit more inviting to annotate your equations!

2 Marking annotation targets within your equation

Use \texttt{\eqnmarkbox\langle color\rangle\langle node name\rangle\langle equation term(s)\rangle} or \texttt{\eqnmark\langle color\rangle\langle node name\rangle\langle equation term(s)\rangle} to define the target of an annotation within your equation. \texttt{\eqnmarkbox} adds background shading, whereas \texttt{\eqnmark} changes the text color. (You can also use \texttt{\tikzmarknode\langle node name\rangle\langle equation term(s)\rangle}, but this is likely to end up with the arrow tip too close to the target.)

\begin{equation*}
e_{q}^{n} f(x) kT
\end{equation*}

3 Simple annotations

Once you have defined nodes within your equations, you can annotate them using \texttt{\annotate\langle tikz options\rangle\langle annotate keys\rangle\langle node name\rangle\langle annotation text\rangle}. \texttt{\langle tikz options\rangle} is passed through to the options for the TikZ node defining the annotation; its most important use is to set the \texttt{yshift}. For \texttt{\langle annotate keys\rangle}, see section 3.1 \texttt{\langle node name\rangle} is the same name you used to mark the node within the equation, e.g. using \texttt{\eqnmarkbox}. \texttt{\langle annotation text\rangle} is the text of the annotation itself.
\begin{equation*}
\text{my annotation text}
\eqnmarkbox[blue]{node1}{e_q^n}
\eqnmark[red]{node2}{f(x)}
\tikzmarknode{node3}{kT}
\end{equation*}
\begin{equation*}
\annotate[yshift=1em]{}{node1,node2}{my annotation text}
\end{equation*}

You generally need to manually adjust the yshift to move the annotations to an appropriate distance above (or negative values for below) the equation. (You can also adjust xshift if needed, also positive or negative.) The annotation picks the same text color as given to \texttt{\eqnmarkbox} or \texttt{\eqnmark}, but you can also override it using \texttt{color} option.

One annotation can point to multiple targets, and multiple annotations can point to the same target.

### 3.1 Annotation options

\textit{(annotate keys)} can be empty, or contain one or more of:

- above (default) or below,
- right (default) or left,
- label above (default) or label below.

Note: currently only works for \texttt{\annotatetwo} (section 4).

\begin{equation*}
\eqnmarkbox[blue]{a1}{a} \eqnmarkbox[red]{b1}{b} = \eqnmarkbox[green]{b2}{b} \eqnmarkbox[a2]{a}
\end{equation*}
\begin{equation*}
\annotatetwo[yshift=1.5em]{above, label below}{a1}{a2}{var 1}
\annotatetwo[yshift=0.5em]{above}{b1}{b2}{var 2}
\annotatetwo[yshift=-0.5em]{below}{b2}{b1}{var 2}
\end{equation*}

4 Double annotations

\texttt{\annotatetwo[\{tikz options\},\{annotate keys\},\{first node name\},\{second node name\},\{annotation text\}].} \texttt{\{tikz options\}} and \texttt{\{annotate keys\}} are as described above in sections 3 and 3.1. Note that \texttt{\{annotate keys\}} left/right have no effect in \texttt{\annotatetwo}.

\begin{equation*}
\text{Color is picked from the first of the two nodes.}
\end{equation*}

5 Package options

5.1 Size of highlight: shrink to content or always full height

\texttt{\eqnhighlightheight} is inserted into every \texttt{\eqnhighlight}, \texttt{\eqncolor}, \texttt{\eqnmark}, and \texttt{\eqnmarkbox} and by redefining it you can specify the minimum height for the corresponding box:
\begin{equation*}
\eqnmarkbox[red]{hbar}{hbar} \eqnmarkbox[blue]{q}{q}
\end{equation*}

\texttt{\textbackslash renewcommand} is used in math mode.

Note that in some cases \texttt{\textbackslash mathstrut} might not be enough, as in the introductory example:

\begin{equation*}
\eqnmarkbox[red]{Hhat}{\hat{H}} \eqnmarkbox[blue]{Psi}{\Psi}
\end{equation*}

You can create custom 0-width characters using \texttt{\textbackslash vphantom}:

\begin{equation*}
\eqnmarkbox[red]{Hhat}{\hat{H}} \eqnmarkbox[blue]{Psi}{\Psi}
\end{equation*}

(It looks more balanced if you still include the \texttt{\textbackslash mathstrut}.)

5.2 Amount of shading of mark highlight

\texttt{\textbackslash eqnhighlightshade} defines the percentage of the specified color to take:

\begin{equation*}
\eqnmarkbox[red]{hbar}{hbar} \eqnmarkbox[blue]{q}{q}
\end{equation*}

By redefining this command, you can change the “alpha” value of the highlight:

\begin{equation*}
\eqnmarkbox[red]{hbar}{hbar} \eqnmarkbox[blue]{q}{q}
\end{equation*}

5.3 Default formatting of annotation labels

\texttt{\textbackslash eqnannotationtext} is a one-argument command that gets the annotation text as an argument and can be used to have consistent formatting:

\begin{verbatim}
\begin{equation*}
\eqnmarkbox[blue]{v}{v}
\end{equation*}
\annotate[yshift=-0.5em]{below}{v}{velocity}
\vspace{1em}
\end{verbatim}
6 Recommendations, tips & tricks

6.1 Use \colorlet for consistent, easily changeable colors

6.2 Line breaks within annotations

Possible, but a bit annoying. By default, the formatting only covers the first line:

Here is a manual work-around:

7 Known issues

- label above/label below not implemented for \annotate.
- Formatting only covers first line in multi-line annotation texts (see section 6.2).