

# So You Wanna Get Good At $\text{\LaTeX}$

Marcell Howard

August 16, 2025

# Useful Packages

- ▶ There are a bunch of packages we can import but which ones *should* we import? We'll break it up in order of decreasing importance

# Useful Packages

- ▶ There are a bunch of packages we can import but which ones *should* we import? We'll break it up in order of decreasing importance
  - ▶ `amsmath`, `amssymb`, `graphicx`,

# Useful Packages

- ▶ There are a bunch of packages we can import but which ones *should* we import? We'll break it up in order of decreasing importance
  - ▶ amsmath, amssymb, graphicx,
  - ▶ physics, hyperref, caption, subcaption, wrapfig, xparse, physunits

# Useful Packages

- ▶ There are a bunch of packages we can import but which ones *should* we import? We'll break it up in order of decreasing importance
  - ▶ amsmath, amssymb, graphicx,
  - ▶ physics, hyperref, caption, subcaption, wrapfig, xparse, physunits
  - ▶ inputenc, chngcntr, nccmath, tensor,

# The Necessary Packages

▶ `amsmath`

▶ `amssymb`

▶ `graphicx`

# The Necessary Packages

- ▶ `amsmath`
  - ▶ Contains every environment to write equations in
  - ▶ Allows for specified alignment of objects in aforementioned environments
- ▶ `amssymb`
- ▶ `graphicx`

# The Necessary Packages

- ▶ `amsmath`
  - ▶ Contains every environment to write equations in
  - ▶ Allows for specified alignment of objects in aforementioned environments
- ▶ `amssymb`
  - ▶ Contains just about any math symbol you've encountered in your life
- ▶ `graphicx`



# The Necessary Packages

- ▶ `amsmath`
  - ▶ Contains every environment to write equations in
  - ▶ Allows for specified alignment of objects in aforementioned environments
- ▶ `amssymb`
  - ▶ Contains just about any math symbol you've encountered in your life
- ▶ `graphicx`
  - ▶ Use if want to include figures

# These Packages Makes Things Look Nice

- ▶ physics
- ▶ hyperref
- ▶ caption/subcaption
- ▶ wrapfig
- ▶ xparse
- ▶ physunits

# These Packages Makes Things Look Nice

- ▶ physics
  - ▶ Contains just about everything a physicist could want
    - ▶ Macros for special/transcendental functions, derivatives, matrices, etc.
- ▶ hyperref
- ▶ caption/subcaption
- ▶ wrapfig
- ▶ xparse
- ▶ physunits

# These Packages Makes Things Look Nice

- ▶ physics
  - ▶ Contains just about everything a physicist could want
    - ▶ Macros for special/transcendental functions, derivatives, matrices, etc.
- ▶ hyperref
  - ▶ Makes the `\ref` command hyperlinkable
- ▶ caption/subcaption
- ▶ wrapfig
- ▶ xparse
- ▶ physunits

# These Packages Makes Things Look Nice

- ▶ physics
  - ▶ Contains just about everything a physicist could want
    - ▶ Macros for special/transcendental functions, derivatives, matrices, etc.
- ▶ hyperref
  - ▶ Makes the `\ref` command hyperlinkable
  - ▶ Makes urls hyperlinkable in bibliography
- ▶ caption/subcaption
- ▶ wrapfig
- ▶ xparse
- ▶ physunits

# These Packages Makes Things Look Nice

- ▶ physics
  - ▶ Contains just about everything a physicist could want
    - ▶ Macros for special/transcendental functions, derivatives, matrices, etc.
- ▶ hyperref
  - ▶ Makes the `\ref` command hyperlinkable
  - ▶ Makes urls hyperlinkable in bibliography
- ▶ caption/subcaption
  - ▶ Provides flexibility for captioning figures and subfigures
- ▶ wrapfig
- ▶ xparse
- ▶ physunits

# These Packages Makes Things Look Nice

- ▶ physics
  - ▶ Contains just about everything a physicist could want
    - ▶ Macros for special/transcendental functions, derivatives, matrices, etc.
- ▶ hyperref
  - ▶ Makes the `\ref` command hyperlinkable
  - ▶ Makes urls hyperlinkable in bibliography
- ▶ caption/subcaption
  - ▶ Provides flexibility for captioning figures and subfigures
- ▶ wrapfig
  - ▶ Allows for figures to be wrapped around the text
- ▶ xparse
  
- ▶ physunits

# These Packages Makes Things Look Nice

- ▶ physics
  - ▶ Contains just about everything a physicist could want
    - ▶ Macros for special/transcendental functions, derivatives, matrices, etc.
- ▶ hyperref
  - ▶ Makes the `\ref` command hyperlinkable
  - ▶ Makes urls hyperlinkable in bibliography
- ▶ caption/subcaption
  - ▶ Provides flexibility for captioning figures and subfigures
- ▶ wrapfig
  - ▶ Allows for figures to be wrapped around the text
- ▶ xparse
  - ▶ Allows for creating new commands (using the `\newcommands{}{}`)
- ▶ physunits



# These Packages Makes Things Look Nice

- ▶ physics
  - ▶ Contains just about everything a physicist could want
    - ▶ Macros for special/transcendental functions, derivatives, matrices, etc.
- ▶ hyperref
  - ▶ Makes the `\ref` command hyperlinkable
  - ▶ Makes urls hyperlinkable in bibliography
- ▶ caption/subcaption
  - ▶ Provides flexibility for captioning figures and subfigures
- ▶ wrapfig
  - ▶ Allows for figures to be wrapped around the text
- ▶ xparse
  - ▶ Allows for creating new commands (using the `\newcommands{}{}`)
- ▶ physunits
  - ▶ Nice and intuitive commands for SI units

# You Don't Need These (But They're Nice)

- ▶ `nccmath`
- ▶ `tensor`
- ▶ `chngctr`
- ▶ `inputenc`

# You Don't Need These (But They're Nice)

- ▶ `nccmath`
  - ▶ Basically the `amsmath` package but more
- ▶ `tensor`
- ▶ `chngctr`
- ▶ `inputenc`

# You Don't Need These (But They're Nice)

- ▶ nccmath
  - ▶ Basically the amsmath package but more
- ▶ tensor
  - ▶ Allows for phantom indices for coding matrices i.e.  $A^\mu_\nu$  instead of  $A^\mu_\nu$
- ▶ chngctr
- ▶ inputenc

# You Don't Need These (But They're Nice)

- ▶ `nccmath`
  - ▶ Basically the `amsmath` package but more
- ▶ `tensor`
  - ▶ Allows for phantom indices for coding matrices i.e.  $A^\mu_\nu$  instead of  $A^\mu_\nu$
- ▶ `chngctr`
  - ▶ Resets counter for equations/figures/tables etc.
- ▶ `inputenc`

# You Don't Need These (But They're Nice)

- ▶ `nccmath`
  - ▶ Basically the `amsmath` package but more
- ▶ `tensor`
  - ▶ Allows for phantom indices for coding matrices i.e.  $A^\mu_\nu$  instead of  $A^\mu_\nu$
- ▶ `chngctr`
  - ▶ Resets counter for equations/figures/tables etc.
- ▶ `inputenc`
  - ▶ Sets the unicode version for  $\text{\LaTeX}$  but is now obsolete

# Useful Commands

► physics

# Useful Commands

- ▶ physics
  - ▶ `\qty`
- ▶ vector notation
- ▶ special functions
- ▶ matrix macros



# Useful Commands

- ▶ physics
  - ▶ `\qty`
    - ▶ Can't use when using `newline` in an equation environment. Must use `\left` and `\right` with `\` at the beginning and end of each line break
  - ▶ vector notation
  - ▶ special functions
  - ▶ matrix macros

# Useful Commands

- ▶ physics
  - ▶ `\qty`
    - ▶ Can't use when using `newline` in an equation environment. Must use `\left` and `\right` with `\` at the beginning and end of each line break
  - ▶ vector notation
    - ▶ `\vb{a}`, `\va{a}`, `\vu{a}`,
  - ▶ special functions
- ▶ matrix macros

# Useful Commands

- ▶ physics
  - ▶ `\qty`
    - ▶ Can't use when using newline in an equation environment. Must use `\left` and `\right` with `\` at the beginning and end of each line break
  - ▶ vector notation
    - ▶ `\vb{a}`, `\va{a}`, `\vu{a}`,
  - ▶ special functions
    - ▶ `\sin`, `\cos`, `\ldots` → `sin`, `cos`, ...
    - ▶ `\exp`, `\log`, `\ln`, `\erf`, `\ldots` → `exp`, `log`, `ln`, `erf`, ...
    - ▶ `\det`, `\Pr`, `\Tr`, `\rank`, `\ldots` → `det`, `Pr`, `Tr`, `rank`, ...
  - ▶ matrix macros

# Useful Commands

- ▶ physics
  - ▶ `\qty`
    - ▶ Can't use when using newline in an equation environment. Must use `\left` and `\right` with `\` at the beginning and end of each line break
  - ▶ vector notation
    - ▶ `\vb{a}`, `\va{a}`, `\vu{a}`,
  - ▶ special functions
    - ▶ `\sin`, `\cos`, `\ldots` → `sin`, `cos`, ...
    - ▶ `\exp`, `\log`, `\ln`, `\erf`, `\ldots` → `exp`, `log`, `ln`, `erf`, ...
    - ▶ `\det`, `\Pr`, `\Tr`, `\rank`, `\ldots` → `det`, `Pr`, `Tr`, `rank`, ...
  - ▶ matrix macros
    - ▶ `\mqty(\imat{3})`, `\mqty(\pmat{3})`, `\mqty(\zmat{2}{2})`  
→  $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}, \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$

# Useful Commands Cont.

▶ `amsmath`

▶ `physunits`

# Useful Commands Cont.

- ▶ `amsmath`
  - ▶ `align`
  - ▶ `split`
- ▶ `physunits`

# Useful Commands Cont.

- ▶ `amsmath`
  - ▶ `align`
    - ▶ Aligns equations via placement of `&`
    - ▶ Updates equation counter
  - ▶ `split`
  
- ▶ `physunits`

# Useful Commands Cont.

- ▶ `amsmath`
  - ▶ `align`
    - ▶ Aligns equations via placement of `&`
    - ▶ Updates equation counter
  - ▶ `split`
    - ▶ Also aligns equations via placement of `&`
    - ▶ Does *not* update equation counter
- ▶ `physunits`



# Useful Commands Cont.

- ▶ `amsmath`
  - ▶ `align`
    - ▶ Aligns equations via placement of `&`
    - ▶ Updates equation counter
  - ▶ `split`
    - ▶ Also aligns equations via placement of `&`
    - ▶ Does *not* update equation counter
- ▶ `physunits`
  - ▶ Putting prefixes in front of units is very convenient i.e. kilometers becomes `\m[k]` to get km and gigayears becomes `\y[G]` to get Gy

# More useful commands

- ▶ Can use the back slash for spacing in text and equations

# More useful commands

- ▶ Can use the back slash for spacing in text and equations
- ▶ Using `~` for a non-breaking space (so write Marcell Howard to prevent a line break between Marcell and Howard)

# More useful commands

- ▶ Can use the back slash for spacing in text and equations
- ▶ Using `~` for a non-breaking space (so write Marcell Howard to prevent a line break between Marcell and Howard)
- ▶ Spacing in equations (`-;` = thick `-:` = medium `-,` = thin, `-(space)` = single space, `-!` = negative thin space,)

# More useful commands

- ▶ Can use the back slash for spacing in text and equations
- ▶ Using `~` for a non-breaking space (so write Marcell Howard to prevent a line break between Marcell and Howard)
- ▶ Spacing in equations (`-;` = thick `-:` = medium `-,` = thin, `- (space)` = single space, `-!` = negative thin space,)
- ▶ Can use a double back slash for newlines

# More useful commands

- ▶ Can use the back slash for spacing in text and equations
- ▶ Using `~` for a non-breaking space (so write Marcell Howard to prevent a line break between Marcell and Howard)
- ▶ Spacing in equations (`-;` = thick `-:` = medium `-,` = thin, `-(space)` = single space, `-!` = negative thin space,)
- ▶ Can use a double back slash for newlines
- ▶ The `\rm` command un-italicizes letters

# For Big Projects

- ▶ We can store the preamble, chapters, etc. in different TeX files and call them!

# For Big Projects

- ▶ We can store the preamble, chapters, etc. in different TeX files and call them!
- ▶ Use the `\input`, `\include`, or `\import` functions