



McGill

ESSENTIAL $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ EQUATION TOOLS

HANNAH WAKELING | BELLE II ACADEMY 2021

LATEX EQUATIONS

AND HOW TO MAKE YOUR LIFE EASIER

Have you ever seen an equation in a paper and had to write it out manually in LaTeX?

Have you ever wanted to add nice equations to your presentations but are stuck with powerpoint substitutes?

Here are my tools, tips and tricks that could make life easier for you as you live the LaTeX and presentation life.

$$\int_1^x \sum_{p \leq u} \left\lfloor \frac{\log u}{\log p} \right\rfloor \log p \, du = \frac{1}{2\pi i} \int_{c-i\infty}^{c+i\infty} \frac{x^{s+1}}{s(s+1)} \left(-\frac{\zeta'(s)}{\zeta(s)} \right) ds$$

$$g^{(1)}(\tau) = \frac{\langle E_s^*(0) E_s(\tau) \rangle}{\langle |E_s|^2 \rangle}$$

$$\lim_{x \rightarrow \infty} \frac{\pi(x)}{x / \ln(x)} = 1$$

$$\sum_{k=0}^n \binom{n}{k} = 2^n$$

$$\begin{aligned} x^2 - 1 \\ &= (x - 1)(x + 1) \\ &= 7 \end{aligned}$$

$$\oint_C \frac{f'(z)}{f(z)} dz = 2\pi i(N - P)$$



Physics, physics, physics, paper paper paper,
knowledge, knowledge, knowledge, which gives
the following:

$$R_{e\mu} = \frac{\mathcal{B}(\bar{B}^0 \rightarrow D^{*+} e^- \bar{\nu}_e)}{\mathcal{B}(\bar{B}^0 \rightarrow D^{*+} \mu^- \bar{\nu}_\mu)}$$

LATEX TOOLS

THAT HAVE BEEN REALLY USEFUL



MathPix Snipping Tool iOS/Android/macOS/Windows/Linux
Snapshots any equation/table and converts to LaTeX

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The screenshot shows the MathPix app interface with several physics-related items:

- Top Tables:** Two tables labeled "Hadron" comparing "Data" and "MC" results. The first table includes columns for Filter OFF, Filter ON, $B\bar{B}$, $c\bar{c}$, $q\bar{q}$, $\tau\tau$, and $\mu\mu$. The second table is similar but uses $B\bar{B}$, $c\bar{c}$, $q\bar{q}$, $\tau\tau$, and $\mu\mu$ for the MC columns.
- Equations:**
 - $p_{\text{miss}} = p_\nu = p_{e^+e^-} - p_{\text{tag}} - p_{D^*} - p_\ell$
 - $R_{e\mu} = \frac{\mathcal{B}(\bar{B}^0 \rightarrow D^{*+} e^- \bar{\nu}_e)}{\mathcal{B}(\bar{B}^0 \rightarrow D^{*+} \mu^- \bar{\nu}_\mu)}$
 - $\mathcal{B}_{\text{wa}}(\bar{B}^0 \rightarrow D^{*+} \ell^- \bar{\nu}_\ell) = (4.88 \pm 0.01 \pm 0.10) \times 10^{-2}$
- Error Source Table:**

Error Source	$\Delta\mathcal{B}$ [%]
Tagging Calibration	3.6
Tracking Efficiency	1.6
$N_{B\bar{B}}$	1.4
f_{+0}	1.1
PDF shapes	0.9
π^0 Efficiency	0.5
$\mathcal{B}(D \rightarrow K\pi(\pi)(\pi))$	0.4
$\mathcal{B}(D^* \rightarrow D\pi)$	0.2
$\mathcal{B}(\bar{B} \rightarrow D^{**} \ell \bar{\nu}_\ell)$	0.2
e PID	0.2
μ PID	0.1
π^0 Eff	0.1

At the bottom, it shows "Free Snips remaining: 100" and an "Upgrade to Pro" button.

LATEX TOOLS

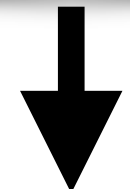
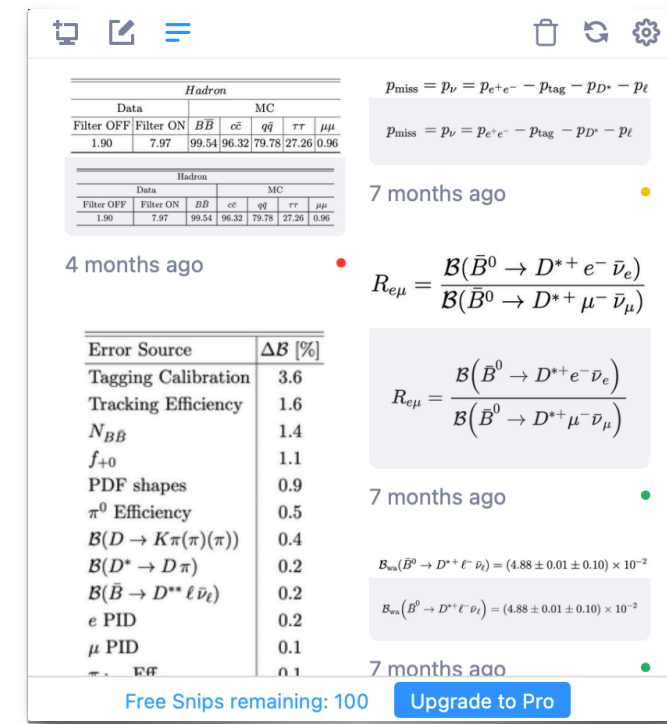
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LaTexiT

macOS (equivalents/alternatives available)

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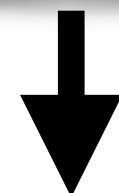
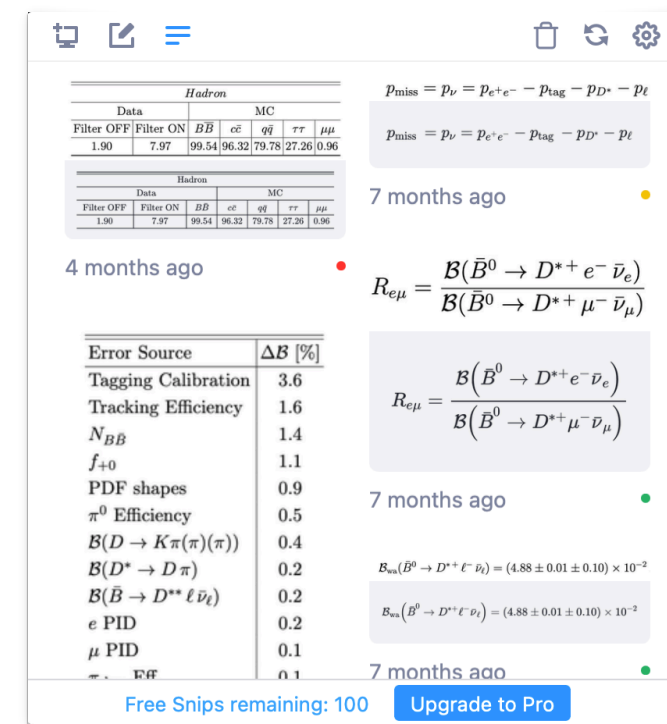


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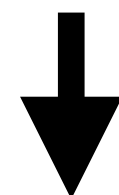
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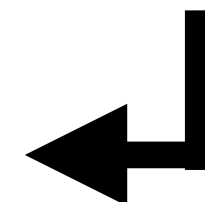
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Which you can then save or copy-and-paste into any presentation



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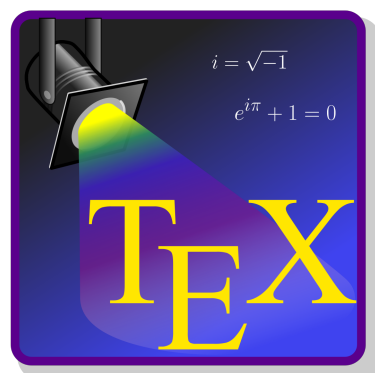
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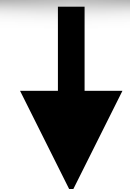
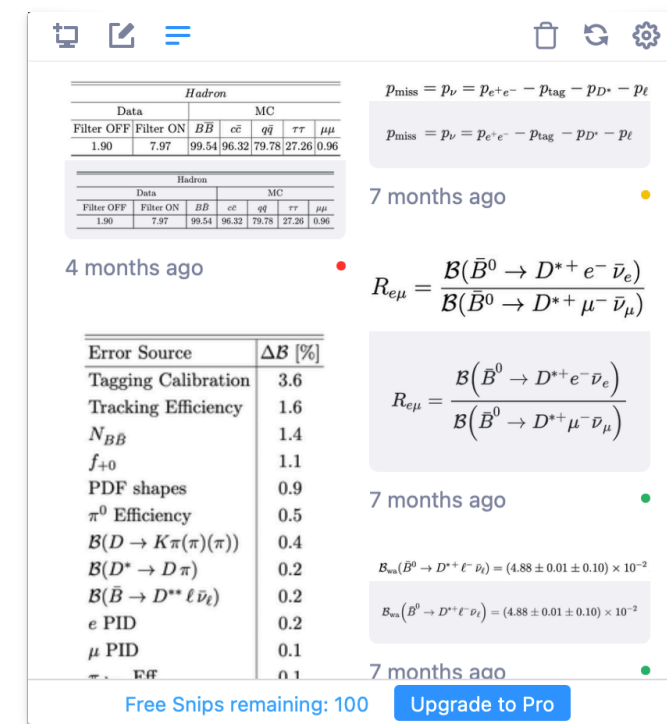
TeXstudio

macOS/Windows/Linux

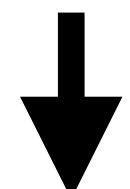
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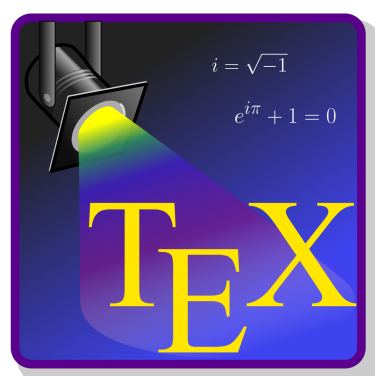
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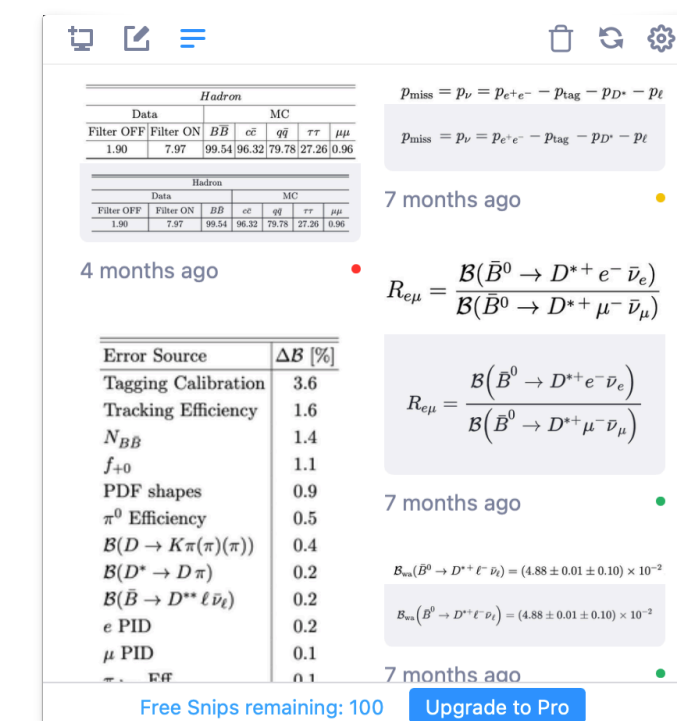
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%TODO add a point about the %TODO function
 %TODO tell everyone how awesome it is
 %TODO present

▼ TODO
 TODO finish sentence
 TODO include example.
 TODO add a point about the %TODO function
 TODO tell everyone how awesome it is
 TODO present

TIPS & TRICKS

THAT YOU SHOULD KNOW IF YOU DON'T ALREADY

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For example I've made it so that if I type "llepton" my mac autocorrects me to ℓ

Or "BDInu" gives $B \rightarrow D(*)\ell v$ making my presentation creation that little bit faster

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Another "incase you don't know already": LaTeX also has a Feynman Diagram packages `tikz-feynman` and `feynMF/feynMP`

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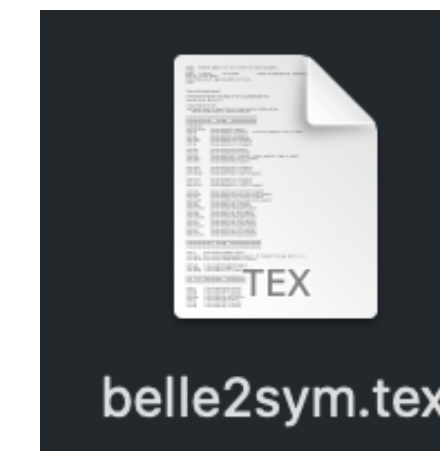
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Have a symbol tex file!

Many already exist so don't start from scratch

for example <https://stash.desy.de/projects/B2D/repos/belle2-note-ph-2017-006/browse/belle2sym.tex>

Store symbols and equations that you will use regularly in a LaTeX document as shortcuts using `\def\basf{\texttt{basf2}}\xspace` or `\newcommand{\basf}{\texttt{basf2}}\xspace` and implement simply by typing `\basf`



Symbols you'll use over and over...

```
\def\Bb    {\ensuremath{\Bbar}\xspace}
\def\BB    {\ensuremath{B\Bbar}\xspace}
\def\Bz    {\ensuremath{B^0}\xspace}
\def\Bzb   {\ensuremath{\Bbar^0}\xspace}
\def\BzBzb {\ensuremath{\Bz {\kern -0.16em \Bzb}}\xspace}
\def\Bu    {\ensuremath{B^+}\xspace}
\def\Bub   {\ensuremath{B^-}\xspace}
\def\Bp    {\ensuremath{\Bu}\xspace}
\def\Bm    {\ensuremath{\Bub}\xspace}
\def\Bpm   {\ensuremath{B^{\pm}}\xspace}
\def\Bmp   {\ensuremath{B^{\mp}}\xspace}
\def\BpBm  {\ensuremath{\Bu {\kern -0.16em \Bub}}\xspace}
\def\Bs    {\ensuremath{B_s}\xspace}
\def\Bsb   {\ensuremath{\Bbar_s}\xspace}
```

or even formatted text that you'll type over and over

```
\def\basf{\texttt{basf2}}\xspace
\def\mcpgd{\texttt{mcPDG}}\xspace
\def\topoana{\texttt{TopoAna}}\xspace
```

Fin