# LaTeX Physics Package in MathJax Mimicking Some of the Commands in LaTeX Physics Package

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### 1 LaTeX Physics Package

This extension is to mimics LaTeX Physics Package<sup>1</sup> in MathJax.

### 2 Some Commands are not Working

The following commands in the Physics Package is not implemented yet:

- All Matrix Macros
- So far everything done here is by string substitution. Whenever commands involving the following cannot be done simply by string substitution and hence not working:
  - 1. \* modified command
  - 2. [] (or ()) is involved
  - 3. variable no. of arguments

<sup>&</sup>lt;sup>1</sup>http://www.ctan.org/pkg/physics

3. ORGANIZATION 2

• Examples of commands that doesn't work: \dv: has all the properties mentioned above

As I mentioned, everything done so far is by string substitution only. Some hints are given in Pull Request#16—MathJax-third-party-extensions<sup>2</sup> but I am too stupid to understand how the above cases should be handled. Feel free to improve it though.

## 3 Organization

physics.xlsx is the master file.

- Columns A-L are copied to test/tables.md
- Columns M-V are copied to unpacked/physics.js
- Columns M-V excluding column O are copied to test/macro.js

 $\label{license.js} \mbox{License.js} \ \mbox{is used to store the license that should be appended to the .js} \ \mbox{files}.$ 

Other files are built automatically by physics.sh. MultiMarkdown<sup>3</sup>, UglifyJS2, LaTeX are assumed. I used it on Mac and have no idea if the way my bash script is written is OS agnostic or not.

#### 4 Test

A test is given in index.html<sup>45</sup> and index.pdf<sup>7</sup>. Compare the LaTeX output and HTML output and you will see which one is working or not.

Instead of extension, it can works as a macro too. See the test in macro.html<sup>8</sup>.

 $<sup>^2</sup> https://github.com/mathjax/MathJax-third-party-extensions/pull/16$ 

<sup>&</sup>lt;sup>3</sup>http://fletcherpenney.net/multimarkdown/download/

 $<sup>^{4} \</sup>rm https://ickc.github.io/MathJax-third-party-extensions/physics/$ 

<sup>&</sup>lt;sup>5</sup>This relies on the CDN of MathJax. i.e. there will be a delay. To see instantaneous test, use macro.html<sup>6</sup>.

<sup>&</sup>lt;sup>7</sup>https://ickc.github.io/MathJax-third-party-extensions/physics/index.pdf

 $<sup>^{8} \</sup>rm https://ickc.github.io/MathJax-third-party-extensions/physics/test/macro.html$ 

Automatic Bracing	Code	
$\left\{\frac{1}{1+\frac{1}{2}}\right\}$		
$\left\{\frac{1}{1+\frac{1}{2}}\right\}$		
$\left(\frac{1}{1+\frac{1}{2}}\right)$		
$\left[\frac{1}{1+\frac{1}{2}}\right]$	$ \ $	
$\begin{bmatrix} \frac{1}{1+\frac{1}{2}} \end{bmatrix}$	$\texttt{\vqty}\{\ \}$	
$\left\{\frac{1}{1+\frac{1}{2}}\right\}$	$\Bqty\{\ \}$	
$\left\lfloor \frac{1}{1+\frac{1}{2}} \right\rfloor$	$\verb \absolutevalue{ }  \}$	
	$\abs\{\ \}$	
$\left\  \frac{1}{1+\frac{1}{2}} \right\ _{12}$		
$\frac{1}{1+\frac{1}{2}} \bigg _{\frac{1}{2}}^{2}$	$\texttt{\ \ } \texttt{\_1^2}$	
$\frac{1}{1+\frac{1}{2}}\Big _{1}^{2}$	$\operatorname{val}\{ \}_{-1}^2$	
$\mathcal{O}\left(\frac{x}{2}\right)^{1}$	$\operatorname{\setminus} order\{\ \}$	
[A,B]	$\operatorname{\mathtt{A}} \{B\}$	
[A,B]	$\operatorname{Comm}\{\mathtt{A}\}\ \{\mathtt{B}\}$	c- 3
$\{A,B\}$	\anticommutator{A}	{B}
$\{A,B\}$	\acomm{A} {B}	(ם)
$     \{A, B\}      \{A, B\} $	$\begin{tabular}{ll} $\langle poissonbracket\{A\} \\ $\langle pb\{A\} \ \{B\} \end{tabular}$	(¤) —

Vector Notation	Code
a	$\vectorbold\{\ \}$
a	
$\psi$	
$\boldsymbol{a}$	\vb*{ }
$oldsymbol{\psi}$	  \vb*{ } \vb*{ }
$ec{\mathbf{a}}$	
$\vec{\mathbf{a}}$	
$ec{\psi}$	$ackslash  exttt{va} \{ \ \}$
$ec{a}$	\va*{ }
$ec{\psi}$	$\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $
â	$\vectorunit\{\ \}$
â	
$\hat{\psi}$	
$\hat{m{a}}$	\vu*{ }
$\hat{\psi}$	\vu*{ }
•	\dotproduct
$ec{\psi}$ $ec{a}$ $ec{\psi}$ $\hat{a}$ $\hat{a}$ $\hat{\psi}$ $\hat{a}$ $\hat{\psi}$ .	\vdot
×	$ackslash {\sf crossproduct}$
×	$ackslash \operatorname{cross}$
×	\cp
$\mathbf{\nabla}(\psi)$	\gradient()
$\nabla(\psi)$	\grad( )
$\mathbf{\nabla}[\psi]$	\grad[]
$\nabla \psi$	
$\nabla \cdot (\psi)$	\divergence()
$\nabla \cdot (\psi)$	\div( )
$\nabla \cdot [\psi]$	\div[]
$\nabla \cdot \psi$	
$\nabla \times (\psi)$	\curl( )
$\nabla \times [\psi]$	\curl[]
$\nabla \times \psi$	
$\nabla^2(\psi) \\ \nabla^2[\psi]$	\laplacian() \laplacian[]
$\nabla \psi \nabla^2 \psi$	<pre>\laplacian[ ] </pre>
ν ψ	/rahracian( )

Operators	Code
$\frac{1}{\sin x}$	\sin
$\sin(x)$	$\setminus sin()$
$\sin^2(x)$	\sin[2]()
$\operatorname{tr} \rho$	\tr
$\operatorname{Tr} \rho$	\Tr
${\rm rank} M$	$\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $
$\operatorname{erf}(x)$	\erf( )
$\operatorname{Res}[f(z)]$	\Res[ ]
$\mathcal{P} \int f(z) dz$	
$\mathcal{P} \int f(z) dz$	
$P.V.\int f(z) dz$	
$\operatorname{Re}\left\{\frac{1}{1+\frac{i}{2}}\right\}$	$\mathbb{Re}\{\ \}$
$\operatorname{Im}\left\{\frac{1}{1+\frac{i}{2}}\right\}$	

Quick Quad Text	Code
some texts	$\sqrt{qqtext{}}$
some texts	$\neq $
some texts	\qq*{ }
,	$\backslash \mathtt{qcomma}$
,	\qc
c.c.	\qcc
if	$\setminus \mathtt{qif}$
then	$\setminus$ qthen
else	$\setminus  exttt{qelse}$
otherwise	$\setminus$ qotherwise
unless	$\setminus \mathtt{qunless}$
given	$\setminus \texttt{qgiven}$
using	$\setminus \mathtt{qusing}$
assume	$\setminus \mathtt{qassume}$
since	$\setminus  ext{qsince}$
let	$ackslash  extstyle{qlet}$
for	$\setminus  exttt{qfor}$
all	$\qall$
even	$\setminus$ qeven
odd	\qodd
integer	$\setminus$ qinteger
and	$\setminus$ qand
or	\qor
as	$\backslash  ext{qas}$
in	$\neq$

Derivatives	Code
dx	
$\mathrm{d}x$	
$d^3x$	$\d[3] \{x\}$
$d(\cos \theta)$	\dd( )
$\frac{d}{dx}$	$\det\{\ \}$
$\frac{\mathrm{d}f}{\mathrm{d}x}$	$\det\{\ \}\{x\}$
$\frac{d\tilde{f}}{dx}$	$\det \{ \}\{x\}$
$\frac{\mathrm{d}^n f}{\mathrm{d} x^n}$	\dv[]{f}{x}
$\frac{\frac{\mathrm{d}f}{\mathrm{d}x}}{\frac{\mathrm{d}f}{\mathrm{d}x}}$ $\frac{\mathrm{d}}{\mathrm{d}x} \frac{f}{\mathrm{d}x^n}$ $\frac{\mathrm{d}}{\mathrm{d}x} (x^2 + x^3)$	$dv{x}()$
df/dr	$dv*{} {x}$
$\frac{\partial}{\partial x}$	
$\frac{\partial}{\partial x} \frac{\partial}{\partial x} \frac{\partial}{\partial x} \frac{\partial}{\partial x} \frac{\partial}{\partial x} \frac{\partial}{\partial x} \frac{\partial}{\partial x} (x^2 + x^3)$ $\frac{\partial^2 f}{\partial x^3} \frac{\partial}{\partial x^3} $	$\texttt{partialderivative}\{\ \}\{\mathtt{x}\}$
$\frac{\partial f}{\partial x}$	{x}
$\frac{\partial^n f}{\partial x^n}$	\pdv[ ]{f}{x}
$\frac{\partial^2}{\partial x}(x^2+x^3)$	\pdv{x}( )
$\frac{\partial^2 f}{\partial x^2}$	{x}{y}
OxOy	
$\delta F[g(x)]$	
$\delta(E-TS)$	\var()
$\frac{\delta}{\varepsilon}$	
$\frac{\delta g}{\delta F}$	{g}
$\delta(E - TS)$ $\frac{\delta}{\delta g}$ $\frac{\delta F}{\delta g}$ $\frac{\delta F}{\delta g}$ $\frac{\delta F}{\delta g}$ $\frac{\delta F}{\delta g}$	{ø}
$\frac{\delta g}{\delta}(E-TS)$	\fdv{V}( )
$\frac{\delta V}{\delta F/\delta x}$	\fdv*{ }{x}
01 / 02	/144[ ][v]

```
Dirac Bracket Notation
                                                                                                                                                                                            Code
    \begin{vmatrix} \frac{\psi+\phi}{2} \\ \frac{
                                                                                                                                                                                              \ket{}
                                                                                                                                                                                              \ket*{}
                                                                                                                                                                                             \bra{ }
                                                                                                                                                                                             \bra*{ }
                                                                                                                                                                                             \displaystyle \prod_{i=1}^{r} \frac{1}{rac} + \frac{1}{rac}
                                                                                                                                                                                             \phi {2} {\frac{psi + phi}{2}}
 \left\langle \frac{\psi+\phi}{2} \middle| \frac{\psi+\phi}{2} \right\rangle
                                                                                                                                                                                             \displaystyle \left\{ \frac{\psi + \phi}{2} \right\} \left\{ \frac{\psi}{2} \right\}
                                                                                                                                                                                             + \phi}{2}}
  \langle \frac{\psi+\phi}{2} | \frac{\psi+\phi}{2} \rangle
                                                                                                                                                                                              \braket*{\frac{\psi +}{}}
                                                                                                                                                                                              \phi_{2}_{c} \simeq \phi_{2}
  \left\langle \frac{\psi+\phi}{2} \middle| \frac{\psi+\phi}{2} \right\rangle\left| \frac{\psi+\phi}{2} \middle| \frac{\psi+\phi}{2} \middle| \frac{\psi+\phi}{2} \middle|
                                                                                                                                                                                              \braket{ }
                                                                                                                                                                                              \operatorname{\operatorname{\operatorname{Nouterproduct}}}\operatorname{\operatorname{\operatorname{\operatorname{Imac}}}}\operatorname{\operatorname{\operatorname{\operatorname{Imac}}}}
                                                                                                                                                                                              \phi_{2}_{2}_{rac}\
 \left|\frac{\psi+\phi}{2}\right\rangle\left\langle\frac{\psi+\phi}{2}\right\rangle
                                                                                                                                                                                              \dyad{\frac{psi + phi}{2}}{\frac{psi + phi}{2}}
                                                                                                                                                                                              \phi}{2}}
 \left|\frac{\psi+\phi}{2}\right\rangle\left\langle\frac{\psi+\phi}{2}\right|
                                                                                                                                                                                             \ \left[ \frac{\psi}{2} \right] 
                                                                                                                                                                                             + \phi}{2}}
 \left|\frac{\psi+\phi}{2}\right\rangle\left\langle\frac{\psi+\phi}{2}\right|
                                                                                                                                                                                              \inf{\frac{\psi + \phi}{2}}{\frac{\psi + \phi}{2}}
                                                                                                                                                                                              \phi}{2}}
 \left|\frac{\psi+\phi}{2}\right\rangle\left\langle\frac{\psi+\phi}{2}\right|
                                                                                                                                                                                              \ketbra*{\frac{\psi}+}
                                                                                                                                                                                              \phi_{2}_{c} \simeq \phi_{2}
 \begin{vmatrix} \frac{\psi+\phi}{2} \middle\backslash \frac{\psi+\phi}{2} \middle| \\ \frac{\psi+\phi}{2} \middle\rangle \\ \frac{\psi+\phi}{2} \middle\rangle \\ \frac{\psi+\phi}{2} \middle\rangle \\ \langle \psi| \frac{A+B}{2} \middle| \psi \rangle \\ \langle \frac{\psi+\phi}{2} \middle\rangle \\ \langle \frac{\psi+\phi}{2} \middle\rangle \\ \langle m| \frac{A+B}{2} \middle| n \rangle 
                                                                                                                                                                                              \ketbra{ }
                                                                                                                                                                                              \ensuremath{\setminus} \mathtt{expectationvalue}\{\ensuremath{\ }\}
                                                                                                                                                                                              \left\{ \right.
                                                                                                                                                                                             \ensuremath{\texttt{ev}\{\ \}\{\psi\}}
                                                                                                                                                                                             \ensuremath{\mbox{ev*}\{\ensuremath{\mbox{}}\}}
                                                                                                                                                                                             \ev**{ }
                                                                                                                                                                                              \matrixelement{m}{ }{n}
                                                                                                                                                                                              \mathsf{matrixel}\{m\}\{\ \}\{n\}
                                                                                                                                                                                              \mathbb{m}{n}{n}{n}
                                                                                                                                                                                             \mathbf{m}
\frac{\langle m | \frac{A+B}{2} | n \rangle}{|n|}
                                                                                                                                                                                             \mathbf{mel}**\{m\}\{n\}
```