

Typsetting mathematics and making symbolic reference in L^AT_EX

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Abstract

We will learn up some basic skills of typesetting mathematical equations and making symbolic reference in L^AT_EX. We have to make the abstract longer so that the body text of the abstract appears centralised.

1 Typesetting Mathematical equations

There are a few ways to typeset mathematical formula.

1.1 In-line text formula: Sandwiching the formula between \$ \cdots \$

Here is an example of inline text formula $x'^{\mu} = \sum_{\mu=0}^{\mu=3} a'_{\nu} x^{\nu}$. The equation is sandwiched between the \$'s. You can print a *tall* in-line

summation sign $\sum_{\mu=0}^{\mu=3}$ by inserting the command `\displaystyle` before the command `\sum`.

1.2 Displayed formula: Formula sandwiched between `\[...]`, not numbered

This is an example of formula displayed in `displaymath` environment:

$$x = ut + \frac{1}{2}at^2.$$

In this mode, the formula is not numbered.

1.3 Displayed formula using `\begin{equation} ... \end{equation}`, Numbered by default

The following example is displayed in the `math` environment with `\begin{equation} ... \end{equation}`:

$$\frac{d\sigma}{d\Omega} = \frac{\alpha^2}{3s}. \tag{1}$$

We have labelled the equation with the reference name `\label{DiffXS}`. Hence it can be referred to as Eq.(1) using the command `\ref{DiffXS}`.

1.4 Displayed formula using `\begin{eqnarray} ... \end{eqnarray}`, Numbered by default

This mode allows longer equations to be displayed with alignment when the equation splits into two or more lines.

The following example is displayed in the `math` environment with `\begin{eqnarray} ... \end{eqnarray}`:

$$\frac{\partial L}{\partial A_\mu} = \frac{j_\mu}{c}, \quad (2)$$

$$\mathcal{M}_{fi} = \bar{u}_p \gamma_5 u_\Lambda, \quad (3)$$

$$\text{Tr}(\gamma_5 \gamma_\mu \gamma_n u \cdots) = 0. \quad (4)$$

Each of the Eq.(2), (3) and Eq.(4) can be referred.

You can set off the reference number if you don't need them by using `\nonumber`:

$$\begin{aligned} \frac{d\sigma}{d\Omega} &= \frac{\alpha^2}{4s} \\ \sigma &= \frac{4\pi\alpha^2}{2s}, \quad \text{when integrating over solid angle, } d\Omega = 2\pi d(\cos\theta) \end{aligned} \quad (5)$$

In the above example, we have used a few `\;` to create some white space between “ $\sigma = \frac{4\pi\alpha^2}{2s}$ ” and the text “when integrating over solid ...”.

1.5 Text mode in Math mode

Very often you need to type text mode symbols in an equation mode, e.g. $v_{\text{relativistic}}$ or $d_{\text{Fe-N}}$, or

$$\text{Br(A)} \rightarrow \frac{\alpha \text{Br(B)} + \beta \text{Br(C)}}{\alpha^2 + \beta^2}$$

Be noted that the above equation is typed in equation mode without a labelling number via the use of `\nonumber`

1.6 More examples

$$\left(\frac{g_\tau}{g_\nu}\right)^4 = \text{B}(\tau \rightarrow e \nu_e \bar{\nu}_\tau) \times \text{constant}.$$

$$N \approx \int_0^{E_0} E^2 (E_0 - E)^2 \mathrm{d} E$$

$$N\mathrm{d}p\propto\sqrt{1-\left(\frac{m_\nu x}{E_o-E}\right)^2}\,\mathrm{d}p$$

$$\mathbf{d}(f)(\mathbf{\Gamma})\equiv \mathbf{\Gamma}(f)=\lim_{\epsilon\rightarrow 0}\frac{1}{\epsilon}[f(\phi^\alpha+\epsilon\mathbf{\Gamma}^\alpha)-f(\alpha^\alpha)]$$

$$\beta=\beta_\sigma\mathbf{d}\phi^\sigma$$

$$\not{p}^\dagger\not{p}\stackrel{p\rightarrow 0}{\longrightarrow}0$$