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# Article Title

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## Abstract

The abstract serves both as a general introduction to the topic and as a brief, non-technical summary of the main results and their implications. Authors are advised to check the author instructions for the journal they are submitting to for word limits and if structural elements like subheadings, citations, or equations are permitted.

**Keywords:** keyword1, Keyword2, Keyword3, Keyword4

## 1 Introduction

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

Here I am citing Einstein: [?] The Introduction section, of referenced text [?] expands on the background of the work (some overlap with the Abstract is acceptable). The introduction should not include subheadings.

Springer Nature does not impose a strict layout as standard however authors are advised to check the individual requirements for the journal they are planning to submit to as there may be journal-level preferences. When preparing your text please also be aware that some stylistic choices are not supported in full text XML (publication version), including coloured font. These will not be replicated in the typeset article if it is accepted.

## 2 Results

Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text.

### 3 This is an example for first level head—section head

#### 3.1 This is an example for second level head—subsection head

##### 3.1.1 This is an example for third level head—subsubsection head

Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text.

## 4 Equations

Equations in L<sup>A</sup>T<sub>E</sub>X can either be inline or on-a-line by itself (“display equations”). For inline equations use the  $\$ \dots \$$  commands. E.g.: The equation  $H\psi = E\psi$  is written via the command  `$\$H \backslash psi = E \backslash psi\$$` .

For display equations (with auto generated equation numbers) one can use the `equation` or `align` environments:

$$\|\tilde{X}(k)\|^2 \leq \frac{\sum_{i=1}^p \|\tilde{Y}_i(k)\|^2 + \sum_{j=1}^q \|\tilde{Z}_j(k)\|^2}{p+q}. \quad (1)$$

where,

$$\begin{aligned} D_\mu &= \partial_\mu - ig \frac{\lambda^a}{2} A_\mu^a \\ F_{\mu\nu}^a &= \partial_\mu A_\nu^a - \partial_\nu A_\mu^a + gf^{abc} A_\mu^b A_\nu^c \end{aligned} \quad (2)$$

Notice the use of `\nonumber` in the align environment at the end of each line, except the last, so as not to produce equation numbers on lines where no equation numbers are required. The `\label{}` command should only be used at the last line of an align environment where `\nonumber` is not used.

$$Y_{\infty} = \left(\frac{m}{\text{GeV}}\right)^{-3} \left[1 + \frac{3 \ln(m/\text{GeV})}{15} + \frac{\ln(c_2/5)}{15}\right] \quad (3)$$

The class file also supports the use of `\mathbb{}`, `\mathscr{}` and `\mathcal{}` commands. As such `\mathbb{R}`, `\mathscr{R}` and `\mathcal{R}` produces  $\mathbb{R}$ ,  $\mathscr{R}$  and  $\mathcal{R}$  respectively (refer Subsubsection 3.1.1).

## 5 Tables

Tables can be inserted via the normal table and tabular environment. To put footnotes inside tables you should use `\footnotetext[]{\dots}` tag. The footnote appears just below the table itself (refer Tables 1 and 2). For the corresponding footnotemark use `\footnotemark[...]`

**Table 1** Caption text

Column 1	Column 2	Column 3	Column 4
row 1	data 1	data 2	data 3
row 2	data 4	data 5 <sup>1</sup>	data 6
row 3	data 7	data 8	data 9 <sup>2</sup>

Source: This is an example of table footnote.  
This is an example of table footnote.

<sup>1</sup>Example for a first table footnote. This is an example of table footnote.

<sup>2</sup>Example for a second table footnote. This is an example of table footnote.

The input format for the above table is as follows:

```
\begin{table}[<placement-specifier>]
\begin{center}
\begin{minipage}{<preferred-table-width>}
\caption{<table-caption>}\label{<table-label>}%
\begin{tabular}{@{}llll@{}}
\toprule
Column 1 & Column 2 & Column 3 & Column 4\\
\midrule
row 1 & data 1 & data 2 & data 3 \\
row 2 & data 4 & data 5\footnotemark[1] & data 6 \\
row 3 & data 7 & data 8 & data 9\footnotemark[2]\\
```

```

\botrule
\end{tabular}
\footnotetext{Source: This is an example of table footnote.
This is an example of table footnote.}
\footnotetext[1]{Example for a first table footnote.
This is an example of table footnote.}
\footnotetext[2]{Example for a second table footnote.
This is an example of table footnote.}
\end{minipage}
\end{center}
\end{table}

```

**Table 2** Example of a lengthy table which is set to full textwidth

Project	Element 1 <sup>1</sup>			Element 2 <sup>2</sup>		
	Energy	$\sigma_{calc}$	$\sigma_{expt}$	Energy	$\sigma_{calc}$	$\sigma_{expt}$
Element 3	990 A	1168	$1547 \pm 12$	780 A	1166	$1239 \pm 100$
Element 4	500 A	961	$922 \pm 10$	900 A	1268	$1092 \pm 40$

Note: This is an example of table footnote. This is an example of table footnote this is an example of table footnote this is an example of table footnote this is an example of table footnote.

<sup>1</sup>Example for a first table footnote.

<sup>2</sup>Example for a second table footnote.

In case of double column layout, tables which do not fit in single column width should be set to full text width. For this, you need to use `\begin{table*} ... \end{table*}` instead of `\begin{table} ... \end{table}` environment. Lengthy tables which do not fit in textwidth should be set as rotated table. For this, you need to use `\begin{sidewaystable} ... \end{sidewaystable}` instead of `\begin{table*} ... \end{table*}` environment. This environment puts tables rotated to single column width. For tables rotated to double column width, use `\begin{sidewaystable*} ... \end{sidewaystable*}`.

## 6 Figures

As per the L<sup>A</sup>T<sub>E</sub>X standards you need to use eps images for L<sup>A</sup>T<sub>E</sub>X compilation and pdf/jpg/png images for PDFL<sup>A</sup>T<sub>E</sub>X compilation. This is one of the major difference between L<sup>A</sup>T<sub>E</sub>X and PDFL<sup>A</sup>T<sub>E</sub>X. Each image should be from a single input .eps/vector image file. Avoid using subfigures. The command for inserting images for L<sup>A</sup>T<sub>E</sub>X and PDFL<sup>A</sup>T<sub>E</sub>X can be generalized. The package used to insert images in L<sup>A</sup>T<sub>E</sub>X/PDFL<sup>A</sup>T<sub>E</sub>X is the graphicx package. Figures can be inserted via the normal figure environment as shown in the below example:

**Table 3** Tables which are too long to fit, should be written using the “sidewaystable” environment as shown here

Projectile	Element 1 <sup>1</sup>		Element <sup>2</sup>	
	Energy	$\sigma_{calc}$	Energy	$\sigma_{expt}$
Element 3	990 A	1168	780 A	1239 ± 100
Element 4	500 A	961	900 A	1092 ± 40
Element 5	990 A	1168	780 A	1239 ± 100
Element 6	500 A	961	900 A	1092 ± 40

Note: This is an example of table footnote this is an example of table footnote this is an example of table footnote this is an example of table footnote this is an example of table footnote.

<sup>1</sup>This is an example of table footnote.

```

\begin{figure}[<placement-specifier>]
\centering
\includegraphics{<eps-file>}
\caption{<figure-caption>}\label{<figure-label>}
\end{figure}

```



**Fig. 1** This is a widefig. This is an example of long caption this is an example of long caption this is an example of long caption this is an example of long caption

In case of double column layout, the above format puts figure caption-s/images to single column width. To get spanned images, we need to provide `\begin{figure*} ... \end{figure*}`.

For sample purpose, we have included the width of images in the optional argument of `\includegraphics` tag. Please ignore this.

## 7 Algorithms, Program codes and Listings

Packages `algorithm`, `algorithmicx` and `algpseudocode` are used for setting algorithms in L<sup>A</sup>T<sub>E</sub>X using the format:

```

\begin{algorithm}
\caption{<alg-caption>}\label{<alg-label>}
\begin{algorithmic}[1]
. . .
\end{algorithmic}
\end{algorithm}

```

You may refer above listed package documentations for more details before setting `algorithm` environment. For program codes, the “program” package is required and the command to be used is `\begin{program} ... \end{program}`. A fast exponentiation procedure:

```

begin
  for  $i := 1$  to 10 step 1 do
     $\text{expt}(2, i)$ ;
     $\text{newline}()$  od           Comments will be set flush to the right margin
where
proc  $\text{expt}(x, n) \equiv$ 
   $z := 1$ ;
  do if  $n = 0$  then exit fi;

```

```

do if odd( $n$ ) then exit fi;
  comment: This is a comment statement;
   $n := n/2$ ;  $x := x * x$  od;
  { $n > 0$ };
   $n := n - 1$ ;  $z := z * x$  od;
print( $z$ ).
end

```

---

**Algorithm 1** Calculate  $y = x^n$

---

**Require:**  $n \geq 0 \vee x \neq 0$

**Ensure:**  $y = x^n$

```

1:  $y \leftarrow 1$ 
2: if  $n < 0$  then
3:    $X \leftarrow 1/x$ 
4:    $N \leftarrow -n$ 
5: else
6:    $X \leftarrow x$ 
7:    $N \leftarrow n$ 
8: end if
9: while  $N \neq 0$  do
10:  if  $N$  is even then
11:     $X \leftarrow X \times X$ 
12:     $N \leftarrow N/2$ 
13:  else [ $N$  is odd]
14:     $y \leftarrow y \times X$ 
15:     $N \leftarrow N - 1$ 
16:  end if
17: end while

```

---

Similarly, for listings, use the listings package. `\begin{lstlisting}` ... `\end{lstlisting}` is used to set environments similar to `verbatim` environment. Refer to the `lstlisting` package documentation for more details.

```

for i:=maxint to 0 do
begin
  { do nothing }
end;
Write('Case□insensitive□');
Write('Pascal□keywords. ');

```

Environments such as `figure`, `table`, `equation` and `align` can have a label declared via the `\label{#label}` command. For figures and table environments use the `\label{}` command inside or just below the `\caption{}` command. You can then use the `\ref{#label}` command to cross-reference them. As an example, consider the label declared for Figure 1 which is `\label{fig1}`. To cross-reference it, use the command `Figure \ref{fig1}`, for which it comes up as “Figure 1”.

## 8.1 Details on reference citations

Here is an example for `\cite{...}`: [? ]. Another example for `\citep{...}`: [? ]. For author-year citation mode, `\cite{...}` prints Jones et al. (1990) and `\citep{...}` prints (Jones et al., 1990).

## 9 Examples for theorem like environments

<code>\thmstyleone</code>	Numbered, theorem head in bold font and theorem text in italic style
<code>\thmstyletwo</code>	Numbered, theorem head in roman font and theorem text in italic style
<code>\thmstylethree</code>	Numbered, theorem head in bold font and theorem text in roman style

**Theorem 1** (Theorem subhead) Example theorem text. Example theorem text.  
Example theorem text. Example theorem text. Example theorem text. Example theorem  
text. Example theorem text. Example theorem text. Example theorem text. Example  
theorem text. Example theorem text.



[illegible]

*Example 1* Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem.

*Remark 1* Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem.

**Definition 1** (Definition sub head) Example definition text. Example definition text. Example definition text. Example definition text. Example definition text. Example definition text.

[illegible]

*Proof of Theorem 1* Example for proof text. Example for proof text. Example for proof text. Example for proof text. Example for proof text.