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## 1. Introduction

Two classfiles namely `cas-sc.cls` and `cas-dc.cls` were written for typesetting articles submitted in journals of Elsevier's Complex Article Service (CAS) workflow.

### 1.1. Usage

1. `cas-sc.cls` for single column journals.

```
\documentclass[<options>]{cas-sc}
```

2. `cas-dc.cls` for single column journals.

```
\documentclass[<options>]{cas-dc}
```

and have an option `longmktitle` to handle long front matter.

## 2. Front matter

```
\title [mode = title]{This is a specimen $a_b$ title}
\tnotemark[1,2]

\tnotetext[1]{This document is the results of the research
  project funded by the National Science Foundation.}

\tnotetext[2]{The second title footnote which is a longer text
  matter to fill through the whole text width and overflow into
  another line in the footnotes area of the first page.}

\author[1,3]{CV Radhakrishnan}[type=editor,
  auid=000,bioid=1,
  prefix=Sir,
  role=Researcher,
  orcid=0000-0001-7511-2910]

\cormark[1]
\fnmark[1]
\ead{cvr_1@tug.org.in}
\ead[url]{www.cvr.cc, cvr@sayahna.org}
```

# Documentation for Elsevier's Complex Article Service (CAS) L<sup>A</sup>T<sub>E</sub>X template

ELSEVIER LTD

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```
\credit{Conceptualization of this study, Methodology,  
Software}  
  
\address[1]{Elsevier B.V., Radarweg 29, 1043 NX Amsterdam,  
The Netherlands}  
  
\author[2,4]{Han Theh Thanh}[style=chinese]  
  
\author[2,3]{CV Rajagopal}[%  
role=Co-ordinator,  
suffix=Jr,  
]  
\fnmark[2]  
\ead{cvr3@sayahna.org}  
\ead[URL]{www.sayahna.org}  
  
\credit{Data curation, Writing - Original draft preparation}  
  
\address[2]{Sayahna Foundation, Jagathy, Trivandrum 695014,  
India}  
  
\author[1,3]{Rishi T.}  
\cormark[2]  
\fnmark[1,3]  
\ead{rishi@stmdocs.in}  
\ead[URL]{www.stmdocs.in}  
  
\address[3]{STM Document Engineering Pvt Ltd., Mepukada,  
Malayinkil, Trivandrum 695571, India}  
  
\cortext[cor1]{Corresponding author}  
\cortext[cor2]{Principal corresponding author}  
\fntext[fn1]{This is the first author footnote. but is common  
to third author as well.}  
\fntext[fn2]{Another author footnote, this is a very long  
footnote and it should be a really long footnote. But this  
footnote is not yet sufficiently long enough to make two lines  
of footnote text.}
```

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```
\nonumnote{This note has no numbers. In this work we
demonstrate $a_b$ the formation Y\$_1 of a new type of
polariton on the interface between a cuprous oxide slab
and a polystyrene micro-sphere placed on the slab.
}

\begin{abstract}[S U M M A R Y]
This template helps you to create a properly formatted
\LaTeX\ manuscript.

\noindent\texttt{\textbackslash begin{abstract}} \dots
\texttt{\textbackslash end{abstract}} and
\verb+\begin{keyword}+ \verb+...+ \verb+\end{keyword}+
which contain the abstract and keywords respectively.
Each keyword shall be separated by a \verb+\sep+ command.
\end{abstract}

\begin{keywords}
quadrupole exciton \sep polariton \sep \WGM \sep \BEC
\end{keywords}

\maketitle
```

## 2.1. Title

`\title` command have the below options:

1. `title`: Document title
2. `alt`: Alternate title
3. `sub`: Sub title
4. `trans`: Translated title
5. `transsub`: Translated sub title

```
\title[mode=title]{This is a title}
\title[mode=alt]{This is a alternate title}
\title[mode=sub]{This is a sub title}
\title[mode=trans]{This is a translated title}
\title[mode=transsub]{This is a translated sub title}
```

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## This is a specimen $a_b$ title<sup>\*,\*\*</sup>

Sir CV Radhakrishnan<sup>a,c,\*,1</sup> (Researcher), Han Theh Thanh<sup>b,d</sup>, CV Rajagopal Jr<sup>b,c,2</sup>  
(Co-ordinator) and Rishi T.<sup>a,c,\*,1,3</sup>

<sup>a</sup>Elsevier B.V., Radarweg 29, 1043 NX Amsterdam, The Netherlands

<sup>b</sup>Sayahna Foundation, Jagathy, Trivandrum 695014, India

<sup>c</sup>STM Document Engineering Pvt Ltd., Mepukada, Malayinkil, Trivandrum 695571, India

### ARTICLE INFO

**Keywords:**  
quadrupole exciton  
polariton  
WGM  
BEC

### ABSTRACT

This template helps you to create a properly formatted L<sup>A</sup>T<sub>E</sub>X manuscript.  
`\beginabstract ... \endabstract` and `\begin{keyword} ... \end{keyword}` which  
contain the abstract and keywords respectively. Each keyword shall be separated by a  
`\sep` command.

## 1. Introduction

The Elsevier cas-sc class is based on the standard article class and supports almost all of the functionality of that class. In addition, it features commands and options to format the

- document style
- baselineskip
- front matter
- keywords and MSC codes
- theorems, definitions and proofs
- lables of enumerations
- citation style and labeling.

This class depends on the following packages for its proper functioning:

1. natbib.sty for citation processing;
2. geometry.sty for margin settings;
3. fleqn.clo for left aligned equations;
4. graphicx.sty for graphics inclusion;
5. hyperref.sty optional packages if hyperlinking is required in the document;

All the above packages are part of any standard L<sup>A</sup>T<sub>E</sub>X installation. Therefore, the users need not be bothered about downloading any extra packages.

\*This document is the results of the research project funded by the National Science Foundation.

\*\*The second title footnote which is a longer text matter to fill through the whole text width and overflow into another line in the footnotes area of the first page.

This note has no numbers. In this work we demonstrate  $a_b$  the formation Y<sub>1</sub> of a new type of polariton on the interface between a cuprous oxide slab and a polystyrene micro-sphere placed on the slab.

\*Corresponding author

\*\*Principal corresponding author

✉ cvr\_1@tug.org.in (C. Radhakrishnan); cvr3@sayahna.org (C. Rajagopal); rishi@stmdocs.in (R. T.)

www.cvr.cc, cvr@sayahna.org (C. Radhakrishnan); www.sayahna.org (C. Rajagopal); www.stmdocs.in (R. T.)

ORCID(s): 0000-0001-7511-2910 (C. Radhakrishnan)

<sup>1</sup>This is the first author footnote. but is common to third author as well.

<sup>2</sup>Another author footnote, this is a very long footnote and it should be a really long footnote. But this footnote is not yet sufficiently long enough to make two lines of footnote text.

Clip 1: Single column output (classfile: cas-sc.cls).

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This is a specimen  $a_b$  title<sup>\*,\*\*</sup>

Sir CV Radhakrishnan<sup>a,c,\*,1</sup> (Researcher), Han Theh Thanh<sup>b,d</sup>, CV Rajagopal Jr<sup>b,c,2</sup> (Co-ordinator) and Rishi T.<sup>a,c,\*,1,3</sup>

<sup>a</sup>Elsevier B.V., Radarweg 29, 1043 NX Amsterdam, The Netherlands

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<sup>c</sup>STM Document Engineering Pvt Ltd., Mepukada, Malayinkil, Trivandrum 695571, India

## ARTICLE INFO

**Keywords:**  
quadrupole exciton  
polariton  
WGM  
BEC

## 1. Introduction

The Elsevier cas-dc class is based on the standard article class and supports almost all of the functionality of that class. In addition, it features commands and options to format the

- document style
- baselineskip
- front matter
- keywords and MSC codes
- theorems, definitions and proofs
- labels of enumerations
- citation style and labeling.

This class depends on the following packages for its proper functioning:

1. natbib.sty for citation processing;
2. geometry.sty for margin settings;
3. fleqn.clo for left aligned equations;
4. graphicx.sty for graphics inclusion;

\* This document is the results of the research project funded by the National Science Foundation.

\*\* The second title footnote which is a longer text matter to fill through the whole text width and overflow into another line in the footnotes area of the first page.

This note has no numbers. In this work we demonstrate  $a_b$  the formation Y<sub>1</sub> of a new type of polariton on the interface between a cuprous oxide slab and a polystyrene micro-sphere placed on the slab.

\*Corresponding author

\*\*Principal corresponding author

✉ cvr\_1@tug.org.in (C. Radhakrishnan); cvr3@sayahna.org (C. Rajagopal); rishi@stmdocs.in (R. T.)

www.cvr.cc, cvr@sayahna.org (C. Radhakrishnan);  
www.sayahna.org (C. Rajagopal); www.stmdocs.in (R. T.)

ORCID(s): 0000-0001-7511-2910 (C. Radhakrishnan)

<sup>1</sup>This is the first author footnote. but is common to third author as well.

<sup>2</sup>Another author footnote, this is a very long footnote and it should be a really long footnote. But this footnote is not yet sufficiently long enough to make two lines of footnote text.

## ABSTRACT

This template helps you to create a properly formatted L<sup>A</sup>T<sub>E</sub>X manuscript. `\beginabstract ... \endabstract` and `\begin{keyword} ... \end{keyword}` which contain the abstract and keywords respectively. Each keyword shall be separated by a `\sep` command.

5. hyperref.sty optional packages if hyperlinking is required in the document;

All the above packages are part of any standard L<sup>A</sup>T<sub>E</sub>X installation. Therefore, the users need not be bothered about downloading any extra packages.

## 2. Installation

The package is available at author resources page at Elsevier (<http://www.elsevier.com/locate/latex>). The class may be moved or copied to a place, usually, `$TEXMF/tex/latex/elsevier/`, or a folder which will be read by L<sup>A</sup>T<sub>E</sub>X during document compilation. The L<sup>A</sup>T<sub>E</sub>X file database needs updation after moving/copying class file. Usually, we use commands like `mktexlsr` or `texhash` depending upon the distribution and operating system.

## 3. Front matter

The author names and affiliations could be formatted in two ways:

- (1) Group the authors per affiliation.
- (2) Use footnotes to indicate the affiliations.

See the front matter of this document for examples. You are recommended to conform your choice to the journal you are submitting to.

## 4. Bibliography styles

There are various bibliography styles available. You can select the style of your choice in the preamble of this document. These styles are Elsevier styles based on standard styles like Harvard and Vancouver. Please use BibL<sup>A</sup>T<sub>E</sub>X to generate your bibliography and include DOIs whenever available.

Here are two sample references: [7] [7, 8] [7, 9]

## 5. Floats

Figures may be included using the command, `\includegraphics` in combination with or without its several options to further control graphic. `\includegraphics`

Clip 2: Double column output (classfile: cas-dc.cls).

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## 2.2. Author

`\author` command have the below options:

1. `auid`: Author id
2. `bioid`: Biography id
3. `alt`: Alternate author
4. `style`: Style of author name chinese
5. `prefix`: Prefix Sir
6. `suffix`: Suffix
7. `degree`: Degree
8. `role`: Role
9. `orcid`: ORCID
10. `collab`: Collaboration
11. `anon`: Anonymous author
12. `deceased`: Deceased author
13. `twitter`: Twitter account
14. `facebook`: Facebook account
15. `linkedin`: LinkedIn account
16. `plus`: Google plus account
17. `gplus`: Google plus account

```
\author[1,3]{Author Name}[type=editor,  
  auid=000,bioid=1,  
  prefix=Sir,  
  role=Researcher,  
  orcid=0000-0001-7511-2910,  
  facebook=<facebook id>,  
  twitter=<twitter id>,  
  linkedin=<linkedin id>,  
  gplus=<gplus id>]
```

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## 2.3. Various Marks in the Front Matter

The front matter becomes complicated due to various kinds of notes and marks to the title and author names. Marks in the title will be denoted by a star (★) mark; footnotes are denoted by super scripted Arabic numerals, corresponding author by of an Conformal asterisk (\*) mark.

### 2.3.1. Title marks

Title mark can be entered by the command, `\tnotemark[<num>]` and the corresponding text can be entered with the command `\tnotetext[<num>]{<text>}`. An example will be:

```
\title[mode=title]{Leveraging social media news to predict  
stock index movement using RNN-boost}  
  
\tnotemark[1,2]  
  
\tnotetext[1]{This document is the results of the research  
project funded by the National Science Foundation.}  
  
\tnotetext[2]{The second title footnote which is a longer  
text matter to fill through the whole text width and  
overflow into another line in the footnotes area of  
the first page.}
```

`\tnotetext` and `\tnotemark` can be anywhere in the front matter, but shall be before `\maketitle` command.

### 2.3.2. Author marks

Author names can have many kinds of marks and notes:

```
footnote mark : \fnmark[<num>]  
footnote text : \fntext[<num>]{<text>  
affiliation mark : \author[<num>]  
email : \ead{<emailid>  
url : \ead[url]{<url>  
corresponding author mark : \cormark[<num>]  
corresponding author text : \cortext[<num>]{<text>
```

### 2.3.3. Other marks

At times, authors want footnotes which leave no marks in the author names. The note text shall be listed as part of the front matter notes. Class files provides `\nonumnote` for this purpose. The usage

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```
\nonumnote{<text>}
```

and should be entered anywhere before the `\maketitle` command for this to take effect.

## 2.4. Abstract and Keywords

Abstract shall be entered in an environment that starts with `\begin{abstract}` and ends with `\end{abstract}`. Longer abstracts spanning more than one page is also possible in Class file even in double column mode. We need to invoke `longmktitle` option in the class loading line for this to happen smoothly.

The key words are enclosed in a `{keyword}` environment.

```
\begin{abstract}
This is a abstract. \lipsum[3]
\end{abstract}

\begin{keywords}
First keyword \sep Second keyword \sep Third
keyword \sep Fourth keyword
\end{keywords}
```

## 3. Main Matter

### 3.1. Tables

#### 3.1.1. Normal tables

```
\begin{table}
\caption{This is a test caption.}
\begin{tabular*}{\tblwidth}{@{} LLLL@{}}
\toprule
Col 1 & Col 2 \\
\midrule
12345 & 12345 \\
12345 & 12345 \\
12345 & 12345 \\
\bottomrule
\end{tabular*}
\end{table}
```



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### 3.1.2. Span tables

```
\begin{table*}[width=.9\textwidth,cols=4,pos=h]
\caption{This is a test caption.}
\begin{tabular*}{\tblwidth}{@{} LLLLLL@{} }
\toprule
Col 1 & Col 2 & Col 3 & Col4 & Col5 & Col6 & Col7\\
\midrule
12345 & 12345 & 123 & 12345 & 123 & 12345 & 123 \\
12345 & 12345 & 123 & 12345 & 123 & 12345 & 123 \\
12345 & 12345 & 123 & 12345 & 123 & 12345 & 123 \\
\bottomrule
\end{tabular*}
\end{table*}
```

## 3.2. Figures

### 3.2.1. Normal figures

```
\begin{figure}
\centering
\includegraphics[scale=.75]{Fig1.pdf}
\caption{The evanescent light -  $S$  quadrupole coupling
( $g_{1,1}$ ) scaled to the bulk exciton-photon coupling
( $g_{1,2}$ ). The size parameter  $kr_0$  is denoted as  $x$  and
the \PMS is placed directly on the cuprous oxide sample ( $\delta r=0$ ,
See also Fig. \protect\ref{FIG:2}).}
\label{FIG:1}
\end{figure}
```

### 3.2.2. Span figures

```
\begin{figure*}
\centering
\includegraphics[width=\textwidth,height=2in]{Fig2.pdf}
\caption{Schematic of formation of the evanescent polariton on
linear chain of \PMS. The actual dispersion is determined by
the ratio of two coupling parameters such as exciton-\WGM
coupling and \WGM-\WGM coupling between the microspheres.}
\label{FIG:2}
\end{figure*}
```

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### 3.3. Theorem and theorem like environments

CAS class file provides a few hooks to format theorems and theorem like environments with ease. All commands the options that are used with `\newtheorem` command will work exactly in the same manner. Class file provides three commands to format theorem or theorem like environments:

1. `\newtheorem` command formats a theorem in L<sup>A</sup>T<sub>E</sub>X's default style with italicized font for theorem statement, bold weight for theorem heading and theorem number typeset at the right of theorem heading. It also optionally accepts an argument which will be printed as an extra heading in parentheses. Here is an example coding and output:

```
\newtheorem{theorem}{Theorem}
\begin{theorem}\label{thm}
The \WGM evanescent field penetration depth into the
cuprous oxide adjacent crystal is much larger than the
\QE radius:
\begin{equation*}
\lambda_{1S}/2 \pi \left( {\epsilon_{Cu2O}}^{-1} \right)^{1/2} = 414 \mbox{ \AA} \gg a_B = 4.6 \mbox{ \AA}
\end{equation*}
\end{theorem}
```

2. `\newdefinition` command does exactly the same thing as with `\newtheorem` except that the body font is up-shape instead of italic. See the example below:

```
\newdefinition{definition}{Definition}
\begin{definition}
The bulk and evanescent polaritons in cuprous oxide
are formed through the quadrupole part of the light-matter
interaction:
\begin{equation*}
H_{int} = \frac{i e}{m \omega_{1S}} \{ \mathbf{E} \}_{i,s} \cdot \mathbf{p}
\end{equation*}
\end{definition}
```

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3. `\newproof` command helps to define proof and custom proof environments without counters as provided in the example code. Given below is an example of proof of theorem kind.

```
\newproof{pot}{Proof of Theorem \ref{thm}}
\begin{pot}
  The photon part of the polariton trapped inside the \PMS
  moves as it would move in a micro-cavity of the effective
  modal volume  $V \ll 4 \pi r_0^3 / 3$ . Consequently, it
  can escape through the evanescent field. This evanescent
  field essentially has a quantum origin and is due to
  tunneling through the potential caused by dielectric
  mismatch on the \PMS surface. Therefore, we define the
  \emph{evanescent} polariton (\EP) as an evanescent light
  \QE coherent superposition.
\end{pot}
```

### 3.4. Enumerated and Itemized Lists

CAS class files provides an extended list processing macros which makes the usage a bit more user friendly than the default LaTeX list macros. With an optional argument to the `\begin{enumerate}` command, you can change the list counter type and its attributes. You can see the coding and typeset copy.

```
\begin{enumerate}[1.]
  \item The enumerate environment starts with an optional
    argument '1.' so that the item counter will be suffixed
    by a period as in the optional argument.
  \item If you provide a closing parenthesis to the number in the
    optional argument, the output will have closing
    parenthesis for all the item counters.
  \item You can use '(a)' for alphabetical counter and '(i)' for
    roman counter.
\begin{enumerate}[a]
  \item Another level of list with alphabetical counter.
  \item One more item before we start another.
\begin{enumerate}[(i)]
  \item This item has roman numeral counter.
```

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```
\item Another one before we close the third level.
\end{enumerate}
\item Third item in second level.
\end{enumerate}
\item All list items conclude with this step.
\end{enumerate}

\section{Biography}

\verb+\bio+ command have the below options:
\begin{enumerate}
\item \verb+width:+ Width of the author photo (default is 1in).
\item \verb+pos:+ Position of author photo.
\end{enumerate}

\begin{vquote}
\bio[width=10mm,pos=1]{tuglogo.jpg}
\textbf{Another Biography:}
Recent experimental \cite{HARA:2005} and theoretical
\cite{DEYCH:2006} studies have shown that the \WGM can travel
along the chain as "heavy photons". Therefore the \WGM
acquires the spatial dispersion, and the evanescent
quadrupole polariton has the form (See Fig.\ref{FIG:3}):
\endbio
```

## 4. CRediT authorship contribution statement

Give the authorship contribution after each author as

```
\credit{Conceptualization of this study, Methodology,
Software}
```

To print the details use \printcredits

```
\author[1,3]{V. {\=A}nand Rawat}[auid=000,
bioid=1,
prefix=Sir,
role=Researcher,
orcid=0000-0001-7511-2910]
```

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```
\cormark[1]
\fnmark[1]
\ead{cvr_1@tug.org.in}
\ead[url]{www.cvr.cc, www.tug.org.in}

\credit{Conceptualization of this study, Methodology,
        Software}

\address[1]{Indian \TeX{} Users Group, Trivandrum 695014,
            India}

\author[2,4]{Han Theh Thanh}[style=chinese]

\author[2,3]{T. Rishi Nair}[role=Co-ordinator,
                           suffix=Jr]
\fnmark[2]
\ead{rishi@sayahna.org}
\ead[URL]{www.sayahna.org}

\credit{Data curation, Writing - Original draft preparation}

. . .
. . .
. . .
\printcredits
```

## 5. Bibliography

For CAS categories, two reference models are recommended. They are `model1-num-names.bst` and `model2-names.bst`. Former will format the reference list and their citations according to numbered scheme whereas the latter will format according name-date or author-year style. Authors are requested to choose any one of these according to the journal style. You may download these from

The above bsts are available in the following location for you to download:

[https://support.stmdocs.in/wiki/index.php?title=Model-wise\\_bibliographic\\_style\\_files](https://support.stmdocs.in/wiki/index.php?title=Model-wise_bibliographic_style_files) □