`spArticle` Document

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Abstract. This document provides comprehensive instructions for the LaTeX class file `spArticle`. The accompanying text and source code are located within the same directory. The `spArticle` class is designed to offer a fully packaged article template, enabling users to focus exclusively on content creation without the need to manage complex LaTeX code or address grammatical issues. It incorporates nearly all packages commonly utilized by students in scientific and engineering disciplines, allowing users to avoid adding extra code in the preamble. `spArticle` is not tailored specifically for scientific thesis writing; instead, it serves as a versatile template suitable for personal notes, assignments, and similar applications.

1 How to Use

1.1 `.tex` File

To use this template, first download the class file `spArticle.cls` and create a new `.tex` file. In that file, include the following code snippet to specify the essential information for your article.

```
\documentclass[
    author = author,
    affiliation = affiliation,
    date = \today,
    bibstyle = ieee,
    title = title,
    abstract = abstract,
    ref = ref
]{spArticle}
```

If your title, name, affiliation, or abstract is very long or contains advanced elements like mathematical symbols, you may encounter compilation issues [1]. In such cases, I recommend avoiding the use of `\documentclass` options to set private variables. Instead, please use the specialized commands in the preamble provided below.

[1] This happens because any values passed to the `.cls` file via the `\documentclass` command are processed before certain macros are loaded.

```
\spAuthor{Your Name}
\spAffiliation{Your Affiliation}
\spDate{If You want set time manually}
\spTitle{Your Title}
\spAbstract{You can write a lot here}
```

After providing all the necessary information, you no longer need to add any extra packages or typographical customizations manually. Simply begin writing your text between `\begin{document}` and `\end{document}`. This environment is required in the main `.tex` file to indicate where the formal document starts.

So your `.tex` file may like this:

```
\documentclass[
    bibstyle=apa, % specify apa style
    ref=yourref
]{spArticle}
\spAuthor{Sweet Pastry}
\spAffiliation{Fudan University}
\spDate{\today}
\spAbstract{
    This is my abstract, i will...
}

\begin{document}
    \section{Introduction}
```

```
        Long time ago...

    \section{Analysis}
        \subsection{Point1}
            ...
        \subsection{Point2}
            ...

    \section{Conclusion}
        All in all...
\end{document}
```

References in `spArticle` are managed through `biblatex`. To specify a `.bib` file, simply assign its name to the `ref` option. For instance:

```
\documentclass[ref=myref]{spArticle}
```

or

```
\documentclass[ref=myref.bib]{spArticle}
```

If your `.bib` file is named `ref.bib`, you do not need to supply the filename explicitly, because `spArticle` sets the default value of `ref` to `ref`. Note that the `.bib` file must reside in the same directory as the main `.tex` file.

By default, `spArticle` invokes the command `\nocite{*}`, causing all entries in the `.bib` file to appear in the bibliography. If you prefer not to cite all entries—particularly when using a single `.bib` file as a large citation library—you may disable this feature by setting the private Boolean variable `nocite` to `false`, for example:

```
\documentclass[ref=myref, nocite=false]
{spArticle}
```

1.2 Compile

It is recommended to compile using `xelatex` and `biber`. In most cases, the following sequence will suffice:

```
xelatex (tex_file_name) % with .tex or not
biber (tex_file_name) % with no .tex
xelatex (tex_file_name)
xelatex (tex_file_name)
```

This workflow ensures that references and bibliographic entries are correctly generated and updated in your final document.

Occasionally, LaTeX compilers behave unpredictably, generating unusual errors or warnings even when the output document is correct. Moreover, the compilation process may sometimes rely on external tools—such as Python or Inkscape—for tasks like generating visual graphs or processing data. In these cases, it is advisable to include specific options with `xelatex` to ensure a smoother compilation process:

```
xelatex -interaction=nonstopmode
-shell-escape (tex_file_name)
```

2 Feature Library

2.1 Math and Physics Symbol Support

The `spArticle` class automatically loads `amsmath` and other packages that provide a comprehensive suite of mathematical symbols. Consequently, you can enter mathematical expressions directly without the need for additional configuration.

$$\langle x_f, t_f \,|\, x_i, t_i \rangle \;=\; \int \mathcal{D}[x(t)] \;\exp\!\left(\tfrac{i}{\hbar} S[x(t)]\right), \tag{1}$$

$$\gamma_{\text{Berry}} = i \oint_C \left\langle \psi(\lambda) \,|\, \nabla_\lambda \, \psi(\lambda) \right\rangle \cdot \mathrm{d}\lambda, \tag{2}$$

2.2 `tikz`

The `spArticle` class automatically loads the `tikz` package, allowing you to create diagrams and figures directly without any additional configuration.[2]

[2] This figure's origin code is copy from mathcha.

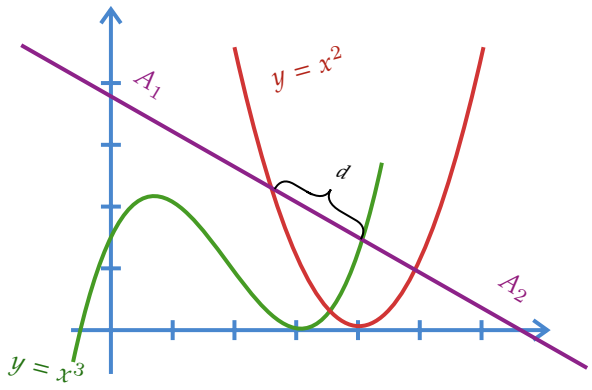


Figure 1: tikz draw graph example

2.2.1 `tikz-cd`

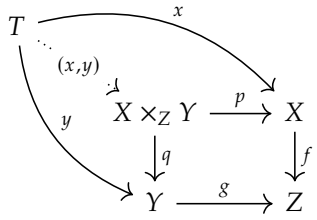


Figure 2: commutative diagram demo1

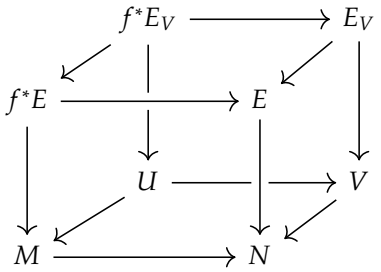


Figure 3: commutative diagram demo2

2.2.2 `circuitikz`

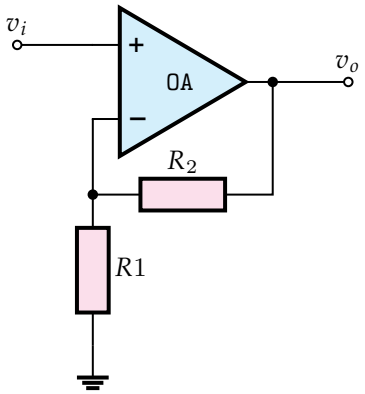


Figure 4: circuit graph demo

2.3 Chemistry

In addition, `spAbstract` loads various chemistry-related macros, including `mhchem` and similar packages.

$$\mathrm{Zn^{2+}} \underset{+2\,\mathrm{H^+}}{\overset{+2\,\mathrm{OH^-}}{\rightleftharpoons}} \underset{\text{amphoteres Hydroxid}}{\mathrm{Zn(OH)_2\downarrow}} \underset{+2\,\mathrm{H^+}}{\overset{+2\,\mathrm{OH^-}}{\rightleftharpoons}} \underset{\text{Hydroxozikat}}{\mathrm{[Zn(OH)_4]^{2-}}}$$

$$x\,\mathrm{Na(NH_4)HPO_4} \xrightarrow{\Delta} (\mathrm{NaPO_3})_x + x\,\mathrm{NH_3}\uparrow + x\,\mathrm{H_2O}$$

$$\mathrm{Hg^{2+}} \xrightarrow{\mathrm{I^-}} \mathrm{HgI_2} \xrightarrow{\mathrm{I^-}} \mathrm{Hg^{II}I_4{}^{2-}} \tag{3}$$

`chemfig` is also provided, here are some example:

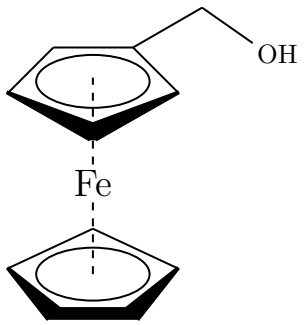


Figure 5: Ferrocene, Fc. author: Lineas de ayuda, cuadricula

https://tex.stackexchange.com/questions/78275/how-to-draw-ligands-with-different-hapticities

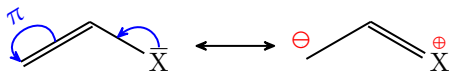


Figure 6: mesomeric effect

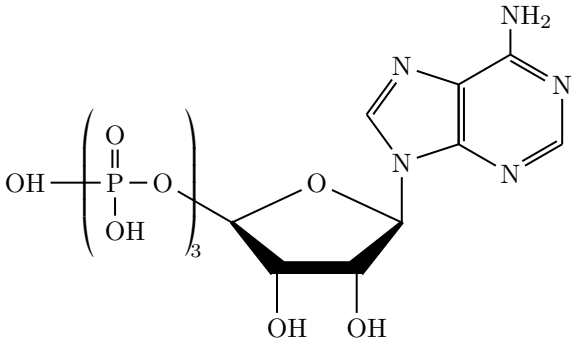
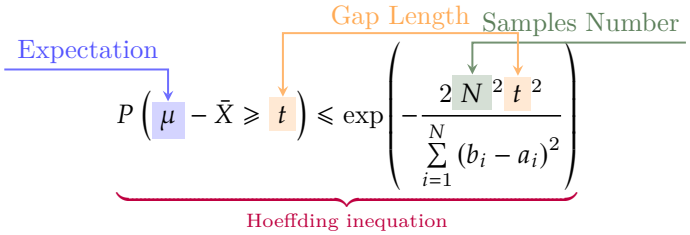


Figure 7: Structure of adenosine triphosphate (ATP), protonated

2.4 hlight math

This insight is derived from the GitHub repository `annotated_latex_equations`.



2.5 lipsum and strip

In some case, when you encounter a long formula in twocolumn mode but you do not want devide this formula into several lines, you can use `strip` environment. Like this:

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

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Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. 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. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

$$\Gamma^{\mathrm{ex-ph}}_{n\mathbf{Q}}(T) = \frac{2\pi}{\hbar}\frac{1}{\mathcal{N}_{\mathbf{q}}}\sum_{m\nu\mathbf{q}}|\mathcal{G}_{nm\nu}(\mathbf{Q},\mathbf{q})|^2\left[\left(N_{\nu\mathbf{q}}+1+F_{m\mathbf{Q}+\mathbf{q}}\right)\times\delta\left(E_{n\mathbf{Q}}-E'_{m\mathbf{Q}+\mathbf{q}}-\hbar\omega_{\nu\mathbf{q}}\right)+\left(N_{\nu\mathbf{q}}-F_{m\mathbf{Q}+\mathbf{q}}\right)\times\delta\left(E_{n\mathbf{Q}}-E'_{m\mathbf{Q}+\mathbf{q}}+\hbar\omega_{\nu\mathbf{q}}\right)\right]$$

Fusce mauris. Vestibulum luctus nibh at lectus. Sed bibendum, nulla a faucibus semper, leo velit ultricies tellus, ac venenatis arcu wisi vel nisl. Vestibulum diam. Aliquam pellentesque, augue quis sagittis posuere, turpis lacus congue quam, in hendrerit risus eros eget felis. Maecenas eget erat in sapien mattis porttitor. Vestibulum porttitor. Nulla facilisi. Sed a turpis eu lacus commodo facilisis. Morbi fringilla, wisi in dignissim interdum, justo lectus sagittis dui, et vehicula libero dui cursus dui. Mauris tempor ligula sed lacus. Duis cursus enim ut augue. Cras ac magna. Cras nulla. Nulla egestas. Curabitur a leo. Quisque egestas wisi eget nunc. Nam feugiat lacus vel est. Curabitur consectetuer.

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The `lipsum` package provides placeholder text for testing layout designs. The `strip` environment relies on the current page's typographic layout to determine the placement of its contents. If the page's layout is not suitable—such as when there are too many figures or insufficient text to divide—unexpected errors or formatting issues may occur.

References

Redaelli, M. A., Lindner, S., Erhardt, S., & Giannetti, R. (2024). *Circuitikz*. https://github.com/circuitikz/circuitikz.

Tellechea, C. (2024). *chemfig: A TeX package for drawing molecules*. https://ctan.org/pkg/chemfig.

Wasserman, T. (2024). *tikzcd: Commutative diagrams with TikZ*. https://ctan.math.washington.edu/tex-archive/graphics/pgf/contrib/tikz-cd/tikz-cd-doc.pdf.

Wen-Wei, L. (2024). *AlJabr-1* (2nd). https://github.com/wenweili/AlJabr-1.