

# L<sup>A</sup>T<sub>E</sub>X

## Editing Papers

Documents are written in plain text with **commands** that determine its structure

Text and commands are processed by LaTeX to produce neatly formatted documents

Extendable, numerous **packages** of extra commands and environments

LaTeX is now the de facto standard in academia!

- Philosophy: *You think about the content,  
LaTeX takes care of the formatting*
- MS Word: *WYSIWYG – What You See Is What You Get*

Conference	Venue	% LaTeX
HB'23	CERN	75 %
FLS'23	Lucerne	66%
IPAC'22, IPAC'23	Bangkok, Venice,	~68%
MEDSI'23	Beijing	9%

Usage within the JACoW community has increased from ~34% to ~68% over the past ~10 years

TeX Distributions:

MiKTeX, TeX Live (Windows, Linux, MacOS)

MacTeX (TeX Live distribution for MacOS)

Overleaf (online, ready to use)

MiKTeX is the installation most used within JACoW Collaboration.

Advantage: easy installation process; automatically loads any missing packages

Current Windows version: 23.10

MiKTeX Console

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Overview

Updates (123)



Documentation

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### Updates


Retrieve from: <Random package repository on the Internet> Change...

Install in: C:\Users\chrin\AppData\Local\Programs\MiKTeX

The following updates are available:

Name	Installed	Available	Action	
<input checked="" type="checkbox"/> miktex-lzm...	2023-05-06 (5.4.0)	2023-10-12 (5.4.0)	install	required
<input checked="" type="checkbox"/> miktex-lcdf...	2023-05-06 (2.1...)	2023-10-12 (2.1...)	install	required
<input checked="" type="checkbox"/> miktex-xml...	2023-05-06 (202...)	2023-10-12 (202...)	install	required
<input checked="" type="checkbox"/> lualibs	2022-10-07 (2.75)	2023-08-21 (2.76)	install	optional
<input checked="" type="checkbox"/> miktex-chkt...	2023-05-06 (1.7.8)	2023-10-12 (1.7.8)	install	required
<input checked="" type="checkbox"/> miktex-mth...	2023-05-06 (23.5)	2023-10-12 (23....)	install	required
<input checked="" type="checkbox"/> miktex-yap-...	2023-05-06 (23.5)	2023-10-12 (23....)	install	required
<input checked="" type="checkbox"/> miktex-cjku...	2023-05-06 (4.8.4)	2023-10-12 (4.8.4)	install	required
<input checked="" type="checkbox"/> miktex-gd-...	2023-05-06 (2.3.3)	2023-10-12 (2.3.3)	install	required
<input checked="" type="checkbox"/> miktex-dvis...	2023-05-06 (3.0.4)	2023-10-12 (3.1.1)	install	required
<input checked="" type="checkbox"/> miktex-zlib...	2023-05-06 (1.2....)	2023-10-12 (1.2....)	install	required
<input checked="" type="checkbox"/> miktex-urip...	2023-05-06 (0.9.7)	2023-10-12 (0.9.7)	install	required
<input checked="" type="checkbox"/> miktex-pix...	2023-05-06 (0.4....)	2023-10-12 (0.4....)	install	required
<input checked="" type="checkbox"/> miktex-log4...	2023-05-06 (0.1...)	2023-10-12 (1.1.0)	install	required
<input checked="" type="checkbox"/> miktex-met...	2023-05-06 (2.7...)	2023-10-12 (2.7...)	install	required
<input checked="" type="checkbox"/> amsmath	2022-06-13 (2.1...)	2023-06-17 (2.1...)	install	optional
<input checked="" type="checkbox"/> miktex-tex2...	2023-05-06 (1.24)	2023-10-12 (1.24)	install	required
<input checked="" type="checkbox"/> miktex-dvic...	2023-05-06 (1.6)	2023-10-12 (1.6)	install	required
<input checked="" type="checkbox"/> miktex-biba...	2023-05-06 (2.5)	2023-10-12 (2.5)	install	required
<input checked="" type="checkbox"/> ltxbase	2022-12-02 (202...)	2023-11-04	install	optional
<input checked="" type="checkbox"/> miktex-zzip...	2023-05-06 (0.1...)	2023-10-12 (0.1...)	install	required
<input checked="" type="checkbox"/> miktex-fribi...	2023-05-06 (0.20)	2023-10-12 (0.20)	install	required
<input checked="" type="checkbox"/> miktex-sync...	2023-05-06 (1.5)	2023-10-12 (1.5)	install	required
<input checked="" type="checkbox"/> babel	2023-05-12 (3.89)	2023-11-16 (3.97)	install	optional
<input checked="" type="checkbox"/> miktex-dvip...	2023-05-06 (202...)	2023-10-12 (202...)	install	required
<input checked="" type="checkbox"/> miktex-posi...	2023-05-06 (2.3.6)	2023-10-12 (2.3.6)	install	required
<input checked="" type="checkbox"/> l3backend	2023-04-27	2023-11-16	install	optional
<input checked="" type="checkbox"/> caption	2023-03-17	2023-10-03	install	optional
<input checked="" type="checkbox"/> luaotfload	2022-10-07 (3.23)	2023-09-03 (3.26)	install	optional
<input checked="" type="checkbox"/> miktex-con...	2023-05-06 (23.5)	2023-10-12 (23....)	install	required
<input checked="" type="checkbox"/> miktex-libre...	2023-05-06 (3.1.4)	2023-10-12 (3.8.1)	install	required
<input checked="" type="checkbox"/> miktex-teck...	2023-05-06 (2.5....)	2023-10-12 (2.5....)	install	required
<input checked="" type="checkbox"/> miktex-mfw...	2023-05-06	2023-10-12	install	required
<input checked="" type="checkbox"/> miktex-cwe...	2023-05-06 (4.7)	2023-10-12 (4.7)	install	required
<input checked="" type="checkbox"/> revtex	2020-10-06 (4.2e)	2023-06-17 (4.2f)	install	optional
<input checked="" type="checkbox"/> miktex-aren...	2023-05-06 (6.0....)	2023-10-12 (6.0....)	install	required

MiKTeX Console


**MiKTeX Console 4.9**  
 © 2018-2023 Christian Schenk

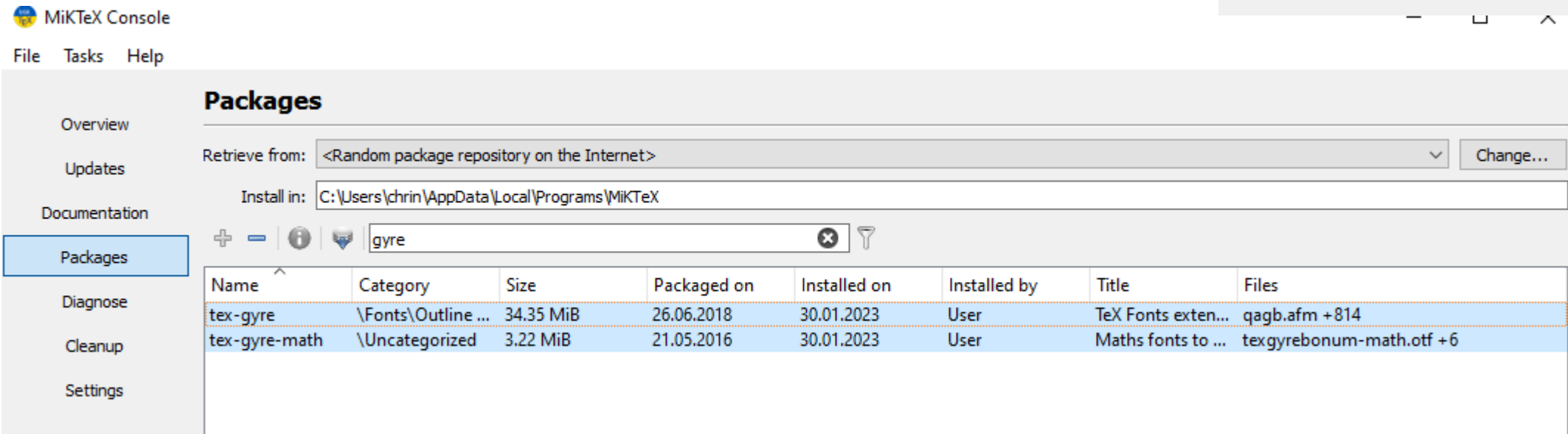
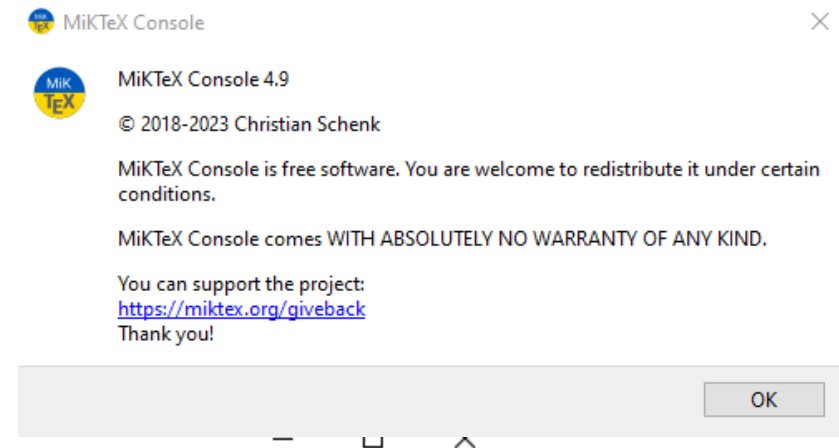
MiKTeX Console is free software. You are welcome to redistribute it under certain conditions.

MiKTeX Console comes WITH ABSOLUTELY NO WARRANTY OF ANY KIND.

You can support the project:  
<https://miktex.org/giveback>  
 Thank you!

Manage updates, packages manually with MiKTeX console.

**tex-gyre** and **tex-gyre-math** packages may need to be specifically sought out.



## TeX Front-ends (i.e., GUI, LaTeX Editors)

Multi-platform, open-source LaTeX editors:

- TeXstudio
- TeXnicCenter (Windows only)
- TeXworks
- WinEdt (Windows only)
- Overleaf (Web)

# L<sup>A</sup>T<sub>E</sub>X

# Editors

## JACoW favourite: TeXstudio

- user friendly
- integrated viewer
- errors clearly displayed
- ...

The screenshot displays the TeXstudio interface. On the left, the source code editor shows LaTeX commands for document structure, including `\addbibresource`, `\listfiles`, `\begin{document}`, `\title`, `\author`, `\maketitle`, and `\begin{abstract}`. The right pane shows the rendered PDF document. The title is "PSI INJECTOR II AND THE 72 MeV TRANSFER LINE: MinT-SIMULATION vs. MEASUREMENTS" by C. Baumgarten, H. Zhang, Paul Scherrer Institut, 5232 Villigen PSI, Switzerland. The abstract discusses the Vortex effect in cyclotrons. The introduction compares MinT calculations with measurements. A diagram of the cyclotron's central region is shown, with labels for various components like RES 1-4, KRP1-4, and the 72 MeV transfer line.

NB. TeXstudio does not provide LaTeX itself. User must choose a TeX distribution (MiKTeX) and install it first.

The formatting in LaTeX documents is determined by the **class**.

The look can be modified, and more functionalities added by means of a package.

(preloaded thru `\usepackage{<package-name>}` – expect to load several for more refined control)

**class** file names have the **.cls** extension,  
**package** file names have the **.sty** extension.

First line in a LaTeX source file (**.tex**) is a document class declaration command

```
\documentclass{article}
```

**article** – scientific journals, short reports

**report** – longer reports with chapters, thesis, etc.

**book** – novels, manuals

**slides** – for slides

**letter** – for writing letters



In addition to the predefined formatting within a class, the user may define certain options specific to their document. Class options are to be inserted in between square brackets, `[]`, before the curly braces, `{}`, that define the class. Multiple options are to be separated by a comma.

```
\documentclass[10pt, a4paper]{article}
```

`10pt, 11pt, 12pt` – sets the document font size (default 10pt)

`a4paper, a5paper, letterpaper, etc.` – paper size

```
\documentclass[a4paper]{jacow}
```

When you write `\documentclass{jacow}` in your LaTeX file, you are including the class file `jacow.cls`.

This defines all the commands like `\title`, `\section` which go into structuring your document.

```
\title{The 3 \NoCaseChange{GeV} Taiwan Light Source}
```

renders: **THE 3 GeV TAIWAN LIGHT SOURCE**

```
\section{RF Shielding at \NoCaseChange{SPring-8}}
```

Renders: **RF SHIELDING AT SPring-8**

Current `jacow.cls` version is v2.15

(v2.16 for IPAC'24, Volker RW Schaa, Zhichu Chen aka. Ross )

<https://jacow.org/Authors/LaTeX>

Check that your Editors are using the latest class file

MiKTeX installation comes with `jacow.cls` (currently v2.14)

Latest `jacow.cls` file to be copied into MiKTeX, e.g., <user> chrin

`C:\Users\chrin\AppData\Local\Programs\MiKTeX\tex\latex\jacow`

V2.15 in conjunction with BibLaTeX, (largely) formats references correctly

A number of features that are already in use but not specified:

<https://www.jacow.org/uploads/Editors/editing-recommendations.pdf>

Emphasis on spacing between digit and unit.

`\usepackage{siunitx}` (already preloaded in jacow.cls)

`\qty[10]{\um}` or `\qty[10]{\micro\meter}` - required way to get an upright unit

`\qty[10]{m}` will give optimized spacing (thin space) between digit and unit

else use `\,` to render a thin space between digit and unit: `10\,m` (rather than `10 m`)

Exceptions: `10\textsuperscript{\circ}C` renders `10°C`

`\usepackage{gensymb}` `\degree`

`\usepackage{textcomp}` `\textdegree`

## Author, Institute listing (by institute; or by author)

Minimal information to identify the institute (no post codes required)

However, some institutes do ask that they be listed in a specific way

M. Marx<sup>1,2</sup>, R. Billen<sup>2</sup>, J. Chrin<sup>2,3</sup>, R. Saethre<sup>4</sup>

<sup>1</sup>Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany

<sup>2</sup>CERN, Geneva, Switzerland

<sup>3</sup>Paul Scherrer Institut, 5232 Villigen PSI, Switzerland

<sup>4</sup>Oak Ridge National Laboratory, Oak Ridge, TN, USA

SLAC National Accelerator Laboratory, Menlo Park, CA, USA

Lawrence Berkeley National Laboratory, Berkeley, CA, USA

To generate a specific output the document has to be compiled by executing a command

```
pdflatex MOP01.tex -> MOP01.pdf
```

Editors include quick-access icons to compile (i.e., run the above commands) to different output formats.

**pdf<sub>l</sub>atex** supports .png, .jpg, .pdf image formats. It will convert .eps images to .pdf on-the-fly during compilation.

**lua<sub>l</sub>atex** supports .png, .jpg, .pdf, and .eps

```
pdflatex MOP01.tex -> MOP01.pdf
```

```
lualatex MOP01.tex -> MOP01.pdf
```

Editors include quick-access icons to compile (i.e., run the above commands) to different output formats.

... as detailed in Ref.~\cite{Kallestrup:IPAC21-MOPAB020}

```
\begin{thebibliography}{9}
```

```
\bibitem{Kallestrup:IPAC21-MOPAB020}
```

J. Kallestrup and M. Aiba,

“Improvements to the SLS booster synchrotron performance towards SLS 2.0”,  
in \emph{Proc. IPAC’21}, Campinas, Brazil, May 2021, pp. 103--106.

```
\url{doi:10.18429/JACoW-IPAC2021-MOPAB020}
```

```
\end{thebibliography}
```

[1] J. Kallestrup and M. Aiba, “Improvements to the SLS booster synchrotron performance towards SLS 2.0”,  
in *Proc. IPAC’21*, Campinas, Brazil, May 2021, pp. 103--106.

doi:10.18429/JACoW-IPAC2021-MOPAB020



```
@inproceedings{xiang:ipac2022-thpopt022,  
  author    = {R. Xiang and A. Arnold and S. Ma and P. Michel and P. Murcek and A.A. Ryzhov and J. Schaber and J. Teichert and P.Z. Zwartek},  
  title     = {{Study on QE evolution of Cs2Te photocathodes in ELBE SRF Gun-II}},  
  booktitle = {Proc. IPAC'22},  
  %booktitle = {Proc. 13th Int. Particle Accel. Conf. (IPAC'22)},  
  pages     = {2617--2619},  
  eid       = {THPOPT022},  
  language  = {english},  
  keywords  = {cathode, gun, SRF, operation, vacuum},  
  venue     = {Bangkok, Thailand},  
  series    = {International Particle Accelerator Conference},  
  number    = {13},  
  publisher = {JACoW Publishing, Geneva, Switzerland},  
  month     = {07},  
  year      = {2022},  
  issn      = {2673-5490},  
  isbn      = {978-3-95450-227-1},  
  doi       = {10.18429/JACoW-IPAC2022-THPOPT022},  
  url       = {https://jacow.org/ipac2022/papers/thpopt022.pdf},  
  abstract  = {{The quality of the photocathodes is critical for the stability and reliability of the photoinjector's operation. Thanks to the robust magnesium and Cs2Te photocathodes, SRF gun-II at HZDR has been proven to be a successful example in CW mode for high current user operation. In this contribution, we will present our observation of the QE evolution of Cs2Te photocathodes during SRF gun operation. The variables including substrate surface, film thickness, Cs/Te stoichiometric, multipacting, RF loading and charge extract are considered in the analysis.}},  
}
```

# L<sup>A</sup>T<sub>E</sub>X

## Bibliography terminology

- **.tex** is the LaTeX document source file, e. g., TUP01.tex
- **.bib** file stores all data about the reference (author, journal, year...) in a structured way. To use a **.bib** file/database with the LaTeX (**.tex**) document, a processor is needed to transform the **.bib** file into something (**.bbl**) that the **.tex** file will understand
- **bibtex** and **biber** are backend programs that process bibliography information. They are the interface between the **.bib** file and the LaTeX document
- **biblatex** is a LaTeX *package* that formats citations and bibliographies for display; actively being developed with biber. Provides a much wider array of *BibTeX* database fields; deals with UTF-8 encoded **.bib** files

Magic comments are comments of the form `% !TEX` or `% !BIB` ... that can be used as directives in many tex editors, for example to specify (from within the document body), which tex engine should be used, the encoding, the language for spell checking etc.

```
% !BIB TS-program = biber/bibtex  The TS stands for TeXShop,  
% !BIB program = biber/bibtex  
% !TeX spellcheck = en_GB/en_US  
% !TeX program = pdflatex/lualatex/xetex  
% !TeX encoding = UTF-8 Unicode/IsoLatin
```

```
\documentclass[a4paper, biblatex]{jacow}  
\addbibresource{MOP01.bib} %Imports the bibtex data file  
\begin{document}  
\printbibliography      %Prints the list of cited references, under title REFERENCES  
\end{document}
```

```
@inproceedings{xiang:ipac2022-thpopt022,
  author    = {R. Xiang and A. Arnold and S. Ma and P. Michel and P. Murcek and A.A. Ryzhov and J. Schaber and J. Teichert and P.Z. Zwartek},
  title     = {{Study on QE evolution of Cs2Te photocathodes in ELBE SRF Gun-II}},
  booktitle = {Proc. IPAC'22},
  %booktitle = {Proc. 13th International Particle Accelerator Conference (IPAC'22)},
  pages     = {2617--2619},
  eid       = {THPOPT022},
  language  = {english},
  keywords  = {cathode, gun, SRF, operation, vacuum},
  venue     = {Bangkok, Thailand, May 2022},
  series    = {International Particle Accelerator Conference},
  number    = {13},
  publisher = {JACoW Publishing, Geneva, Switzerland},
  month     = {07},
  %year     = {2022},
  issn      = {2673-5490},
  isbn      = {978-3-95450-227-1},
  doi       = {10.18429/JACoW-IPAC2022-THPOPT022},
  url       = {https://jacow.org/ipac2022/papers/thpopt022.pdf},
  abstract  = {{The quality of the photocathodes is critical for the stability and reliability of the photoinjector's operation. Thanks to the robust magnesium and Cs2Te photocathodes, SRF gun-II at HZDR has been proven to be a successful example in CW mode for high current user operation. In this contribution, we will present our observation of the QE evolution of Cs2Te photocathodes during SRF gun operation. The variables including substrate surface, film thickness, Cs/Te stoichiometric, multipacting, RF loading and charge extract are considered in the analysis.}},
}
```

```
venue = {Bangkok, Thailand},  
year = {2022}  
month={07}  
eid = {THPOPT022}
```

- [14] R. Xiang *et al.*, “Study on QE evolution of Cs<sub>2</sub>Te photocathodes in ELBE SRF Gun-II,” in *Proc. IPAC’22*, Bangkok, Thailand, 2022, paper THPOPT022, pp. 2617–2619.  
doi:10.18429/JACoW-IPAC2022-THPOPT022

After fine-tuning **.bib** file

```
venue = {Bangkok, Thailand, May 2022},  
%year = {2022}  
%eid = {THPOPT022}
```

- [14] R. Xiang *et al.*, “Study on QE evolution of Cs<sub>2</sub>Te photocathodes in ELBE SRF Gun-II,” in *Proc. IPAC’22*, Bangkok, Thailand, **May 2022**, pp. 2617–2619.  
doi:10.18429/JACoW-IPAC2022-THPOPT022

Bib entry for a contribution to a conference that has been presented  
but not published (no paper submitted)

```
@article{streun,  
title = "{Commissioning results from SLS}",  
author = {Streun, A. and Aiba, M.},  
journal = {\normalfont{presented at IPAC'23, Venice, Italy}},  
year = {May. 2023, paper WEP16},  
}
```

[14] A. Streun and M. Aiba, "Commissioning results from SLS", presented at IPAC'23, Venice, Italy, May 2022, paper WEP16.

## New Editors:

1. Familiarize yourself with the style guide detailed in the template.  
The devil is in the details!
2. Develop the technical TeX skills to execute changes.  
Don't be scared of error messages! Read 'em and fix 'em!