# Pimp your thesis: a minimal introduction to LaTeX.

Maarten Bransen
Adapted by Geert Schulpen
IC/TC, U.S.S. Proton

December 1, 2019

# What is LaTeX?

Most word processors you may be used to (i.e. Microsoft Word, OpenOffice, ...) are “WYSIWYG” *what you see is what you get*. LaTeX is not.

# What is LaTeX?

Most word processors you may be used to (i.e. Microsoft Word, OpenOffice, ...) are “WYSIWYG” *what you see is what you get*. LaTeX is not.

Instead, your document looks something like this:

```
1 \documentclass{article}
2
3 \begin{document}
4 Hello world!
5 \end{document}
```

# What is LaTeX?

Most word processors you may be used to (i.e. Microsoft Word, OpenOffice, ...) are “WYSIWYG” *what you see is what you get*. LaTeX is not.

Instead, your document looks something like this:

```
\documentclass{article}

\begin{document}
Hello world!
\end{document}
```

The result needs to be *compiled* to generate the formatted output!

# What is LaTeX?

In LaTeX you separate *form* and *function*:

```
\section{the section title}
Some text of the new section
```

When you say *what* it is, the program knows what it should look like.

# What is LaTeX?

In LaTeX you separate *form* and *function*:

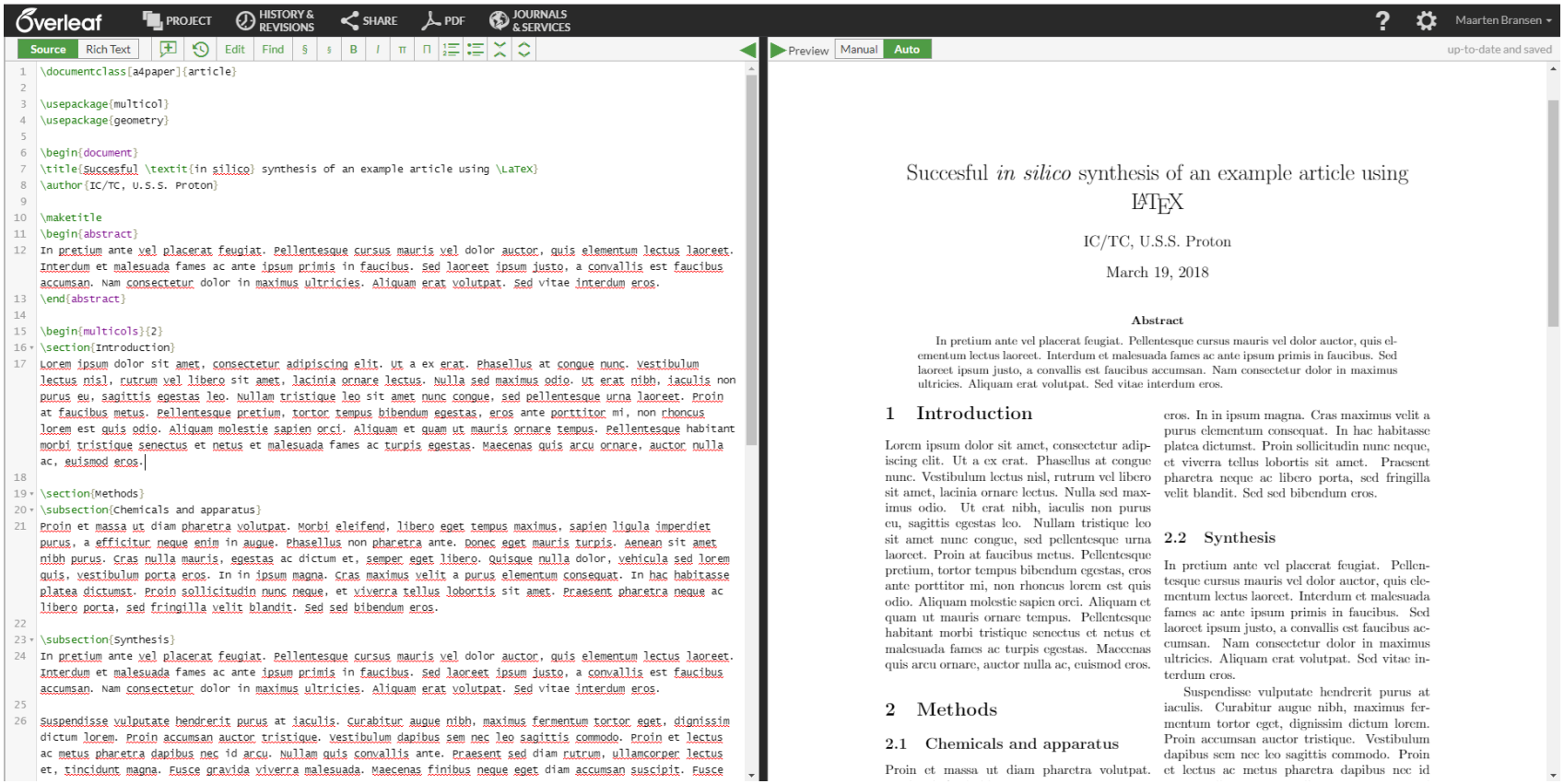
```
\section{the section title}
Some text of the new section
```

When you say *what* it is, the program knows what it should look like.

**In short, LaTeX is a mark-up language for typesetting professional looking and well-designed documents.**

# What is LaTeX?

In practise, you use an *editor* with a user friendly interface to do most of the work for you:



# Why would you use LaTeX?

1. Your documents (thesis) will look professional and well-designed

# Why would you use LaTeX?

1. Your documents (thesis) will look professional and well-designed
2. It is free, open source, and extraordinarily reliable (no bugs!)

# Why would you use LaTeX?

1. Your documents (thesis) will look professional and well-designed
2. It is free, open source, and extraordinarily reliable (no bugs!)
3. Large and active online community, and many resources

# Why would you use LaTeX?

1. Your documents (thesis) will look professional and well-designed
2. It is free, open source, and extraordinarily reliable (no bugs!)
3. Large and active online community, and many resources
4. It uses content-aware algorithms to place your text, figures, tables, etc. where they fit best

# Why would you use LaTeX?

1. Your documents (thesis) will look professional and well-designed
2. It is free, open source, and extraordinarily reliable (no bugs!)
3. Large and active online community, and many resources
4. It uses content-aware algorithms to place your text, figures, tables, etc. where they fit best
5. Numbering of chapters, sections, figures, references, equations, footnotes, etc. is all taken care of automatically

# Why would you use LaTeX?

1. Your documents (thesis) will look professional and well-designed
2. It is free, open source, and extraordinarily reliable (no bugs!)
3. Large and active online community, and many resources
4. It uses content-aware algorithms to place your text, figures, tables, etc. where they fit best
5. Numbering of chapters, sections, figures, references, equations, footnotes, etc. is all taken care of automatically
6. It helps you write well-structured documents

# Why would you use LaTeX?

1. Your documents (thesis) will look professional and well-designed
2. It is free, open source, and extraordinarily reliable (no bugs!)
3. Large and active online community, and many resources
4. It uses content-aware algorithms to place your text, figures, tables, etc. where they fit best
5. Numbering of chapters, sections, figures, references, equations, footnotes, etc. is all taken care of automatically
6. It helps you write well-structured documents
7. You can do everything word processors can, and much, *much* more

# Why would you use LaTeX?

8. Well-formatted mathematics and equations

$$f(x) = \sum_{n=0}^{\infty} \frac{f^n(a)}{n!}(x-a)^n$$

# Why would you use LaTeX?

8. Well-formatted mathematics and equations

$$f(x) = \sum_{n=0}^{\infty} \frac{f^n(a)}{n!}(x-a)^n$$

9. *Reliable* and flexible cross-referencing to pages, figures, chapters, etc. in your document

# Why would you use LaTeX?

8. Well-formatted mathematics and equations

$$f(x) = \sum_{n=0}^{\infty} \frac{f^n(a)}{n!}(x-a)^n$$

9. *Reliable* and flexible cross-referencing to pages, figures, chapters, etc. in your document
10. *Reliable* and flexible referencing for your (scientific) sources with a separately defined style

# Why would you use LaTeX?

8. Well-formatted mathematics and equations

$$f(x) = \sum_{n=0}^{\infty} \frac{f^n(a)}{n!}(x-a)^n$$

9. *Reliable* and flexible cross-referencing to pages, figures, chapters, etc. in your document
10. *Reliable* and flexible referencing for your (scientific) sources with a separately defined style
11. Internal linking in your pdf

# Why would you use LaTeX?

8. Well-formatted mathematics and equations

$$f(x) = \sum_{n=0}^{\infty} \frac{f^n(a)}{n!}(x-a)^n$$

9. *Reliable* and flexible cross-referencing to pages, figures, chapters, etc. in your document
10. *Reliable* and flexible referencing for your (scientific) sources with a separately defined style
11. Internal linking in your pdf
12. Support for vector images (i.e. graphs with infinite resolution)

# Why would you use LaTeX?

8. Well-formatted mathematics and equations

$$f(x) = \sum_{n=0}^{\infty} \frac{f^n(a)}{n!}(x-a)^n$$

9. *Reliable* and flexible cross-referencing to pages, figures, chapters, etc. in your document
10. *Reliable* and flexible referencing for your (scientific) sources with a separately defined style
11. Internal linking in your pdf
12. Support for vector images (i.e. graphs with infinite resolution)
13. Intelligent and automatic hyphenation

# When should I not use LaTeX?

1. When you want an ugly document, *quickly*

# When should I not use LaTeX?

1. When you want an ugly document, *quickly*
2. When you don't want to learn it (or don't have time to)

# When should I not use LaTeX?

1. When you want an ugly document, *quickly*
2. When you don't want to learn it (or don't have time to)
3. When graphics design *is* the purpose of your document

# When should I not use LaTeX?

1. When you want an ugly document, *quickly*
2. When you don't want to learn it (or don't have time to)
3. When graphics design *is* the purpose of your document
4. When your document is already written

# Using LaTeX: basics

LaTeX commands:

- always start with a backslash \
- may have arguments in curly brackets { and }
- may have optional arguments in square brackets [ and ]

# Using LaTeX: basics

LaTeX commands:

- always start with a backslash \
- may have arguments in curly brackets { and }
- may have optional arguments in square brackets [ and ]

```
1 %the preamble
2 \documentclass[11pt]{article}
3 \begin{document}
4 %the body of the document
5 hello world
6 \end{document}
```

The *class* can be `article`, `report`, `book`, etc.

Your content goes between the `\begin{document}` and `\end{document}` commands

# Using LaTeX: basics

LaTeX commands:

- always start with a backslash \
- may have arguments in curly brackets { and }
- may have optional arguments in square brackets [ and ]

```
1 %the preamble
2 \documentclass[11pt]{article}
3 \begin{document}
4 %the body of the document
5 hello world
6 \end{document}
```

The *class* can be `article`, `report`, `book`, etc.

Your content goes between the `\begin{document}` and `\end{document}` commands

Anything following a percent sign % is ignored by the program

# Using LaTeX: basics

When you *compile* this, you get the typeset result:

```
1 %the preamble
2 \documentclass[11pt]{article}
3 \begin{document}%the body of the document
4 hello world
5 \end{document}
```

hello world

# Using LaTeX: adding a title

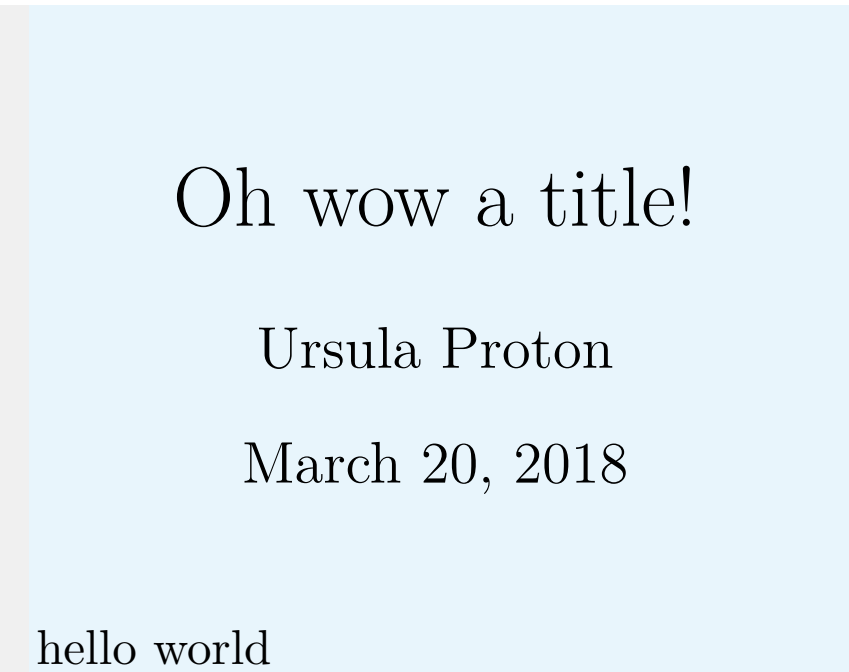
Generally, the commands are pretty straightforward:

```
%the preamble
\documentclass[11pt]{article}
\begin{document}%the body of the document

\title{Oh wow a title!}
\author{Ursula Proton}
\date{\today}

\maketitle
hello world

\end{document}
```



# Using LaTeX: sections

Generally, the commands are pretty straightforward:

```
%the preamble
\documentclass[11pt]{article}
\begin{document}%the body of the document

\section{A section}
Which can be followed by anything else.

\subsection{a subsection}
Some text that is part of this section.

\subsubsection{a subsubsection}
More text here.

\end{document}
```

## 1 A section

Which can be followed by anything else.

### 1.1 a subsection

Some text that is part of this section.

#### 1.1.1 a subsubsection

More text here.

# Using LaTeX: sections

Generally, the commands are pretty straightforward:

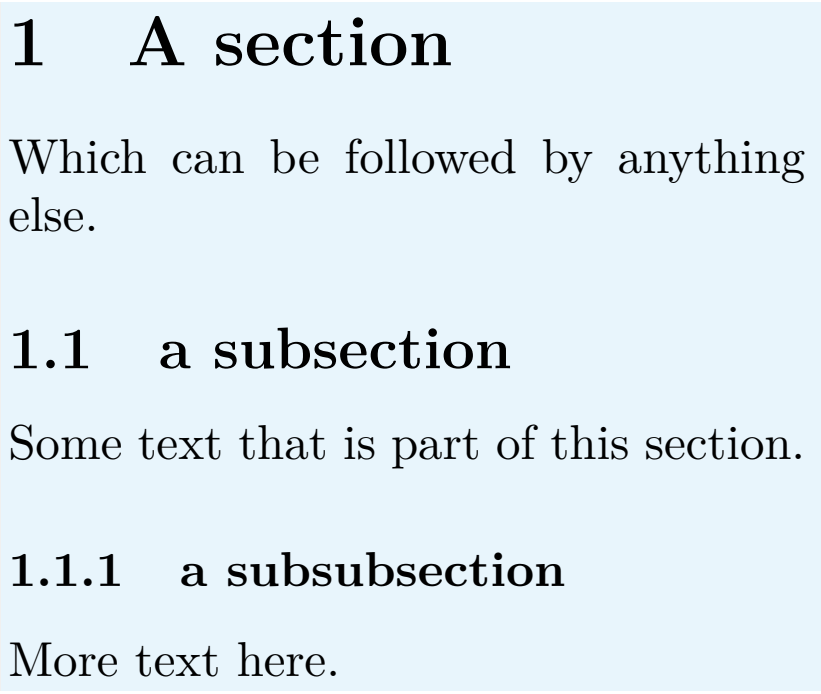
```
%the preamble
\documentclass[11pt]{article}
\begin{document}%the body of the document

\section{A section}
Which can be followed by anything else.

\subsection{a subsection}
Some text that is part of this section.

\subsubsection{a subsubsection}
More text here.

\end{document}
```



1 A section

Which can be followed by anything else.

1.1 a subsection

Some text that is part of this section.

1.1.1 a subsubsection

More text here.

empty lines are ignored, spacing is set by the commands themselves

# Intermezzo: preamble and body

The preamble:

[1] more on that later

# Intermezzo: preamble and body

The preamble:

- is the part *before* the `\begin{document}` command
- contains most of the “technical” stuff
- contains the commands and definitions that apply *globally* (to the whole document)
- is where you load packages[1]

[1] more on that later

# Intermezzo: preamble and body

The preamble:

- is the part *before* the `\begin{document}` command
- contains most of the “technical” stuff
- contains the commands and definitions that apply *globally* (to the whole document)
- is where you load packages[1]

The body of the document:

[1] more on that later

# Intermezzo: preamble and body

The preamble:

- is the part *before* the `\begin{document}` command
- contains most of the “technical” stuff
- contains the commands and definitions that apply *globally* (to the whole document)
- is where you load packages[1]

The body of the document:

- is the part *after* the `\begin{document}` command
- contains your text, images, etc.
- contains styling commands that apply *locally*, i.e. any deviation from the general document style.

[1] more on that later

# Intermezzo: packages

Default LaTeX is very basic, most functions are introduced via *packages*:

# Intermezzo: packages

Default LaTeX is very basic, most functions are introduced via *packages*:

- packages are made by users

# Intermezzo: packages

Default LaTeX is very basic, most functions are introduced via *packages*:

- packages are made by users
- exist for virtually any purpose you can imagine

# Intermezzo: packages

Default LaTeX is very basic, most functions are introduced via *packages*:

- packages are made by users
- exist for virtually any purpose you can imagine
- are usually well-documented

# Intermezzo: packages

Default LaTeX is very basic, most functions are introduced via *packages*:

- packages are made by users
- exist for virtually any purpose you can imagine
- are usually well-documented
- are an essential part of LaTeX

# Intermezzo: packages

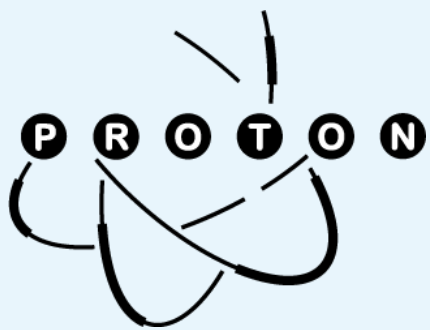
Default LaTeX is very basic, most functions are introduced via *packages*:

- packages are made by users
- exist for virtually any purpose you can imagine
- are usually well-documented
- are an essential part of LaTeX

Adding an image:

```
1  \documentclass[11pt]{article}
2  \usepackage{graphicx}
3  %the package is loaded in the preamble
4
5  \begin{document}
6
7  hello world
8  \includegraphics[width=4cm]{protonlogo}
9
10 \end{document}
```

hello world



# An example document

```
%the preamble
\documentclass[11pt]{article}
\usepackage{graphicx}
\usepackage{float}

\begin{document}

%first create the title
\title{Oh wow it is an example document!}
\author{Ursula Proton}
\date{\today}
\maketitle

%add a table of contents
\tableofcontents

%then the first section
\section{Some text}
Shall I compare thee to a summer's day? Thou art more lovely and more temperate. Rough
  winds do shake the darling buds of May, And summer's lease hath all too short a date.
  Sometime too hot the eye of heaven shines, And often is his gold complexion dimmed,
  And every fair from fair sometime declines, By chance or nature's changing course
  untrimmed;

But thy eternal summer shall not fade Nor lose possession of that fair thou ow'st, Nor
  shall death brag thou wander'st in his shade When in eternal lines to time thou grow'
  st. So long as men can breathe or eyes can see, So long lives this, and this gives
  life to thee.
```

Oh wow it is an example document!

Ursula Proton

March 20, 2018

## Contents



## 1 Some text

Shall I compare thee to a summer's day? Thou art more lovely and more temperate. Rough winds do shake the darling buds of May, And summer's lease hath all too short a date. Sometime too hot the eye of heaven shines, And often is his gold complexion dimmed, And every fair from fair sometime declines, By chance or nature's changing course untrimmed;

But thy eternal summer shall not fade Nor lose possession of that fair thou ow'st, Nor shall death brag thou wander'st in his shade When in eternal lines to time thou grow'st. So long as men can breathe or eyes can see, So long lives this, and this gives life to thee.

# An example document

```
\section{More stuff}

%a bit about mathematics
\subsection{Mathematics}
Simple in-line mathematics is put between dollar signs: $1 + 2\chi = \Lambda^2$. A full
  equation is created using the equation environment like this:
\begin{equation}
  \lim_{x \to \infty} \exp(-x) = \frac{N}{3} \int\limits_{-\pi}^\pi\sin{x}\text{d}x
\end{equation}
where $N$ is a meaningless constant I added because either side is equal to 0.

%a bit about figures
\subsection{Figures}
You can create nice figures by putting your image in the \emph{figure} environment.

\begin{figure}
  \centering
  \includegraphics[width=0.25\textwidth]{protonlogo}
  \caption{The logo of Proton}
\end{figure}

\end{document}
```

## 2 More stuff

### 2.1 Mathematics

Simple in-line mathematics is put between dollar signs: $1 + 2\chi = \Lambda^2$. A full equation is created using the equation environment like this:

$$\lim_{x \to \infty} \exp(-x) = \frac{N}{3} \int\limits_{-\pi}^{\pi} \sin x \mathrm{d}x \tag{1}$$

where $N$ is a meaningless constant I added because either side is equal to 0.

### 2.2 Figures

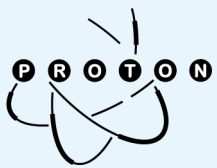



Figure 1: The logo of Proton

You can create nice figures by putting your image in the *figure* environment.

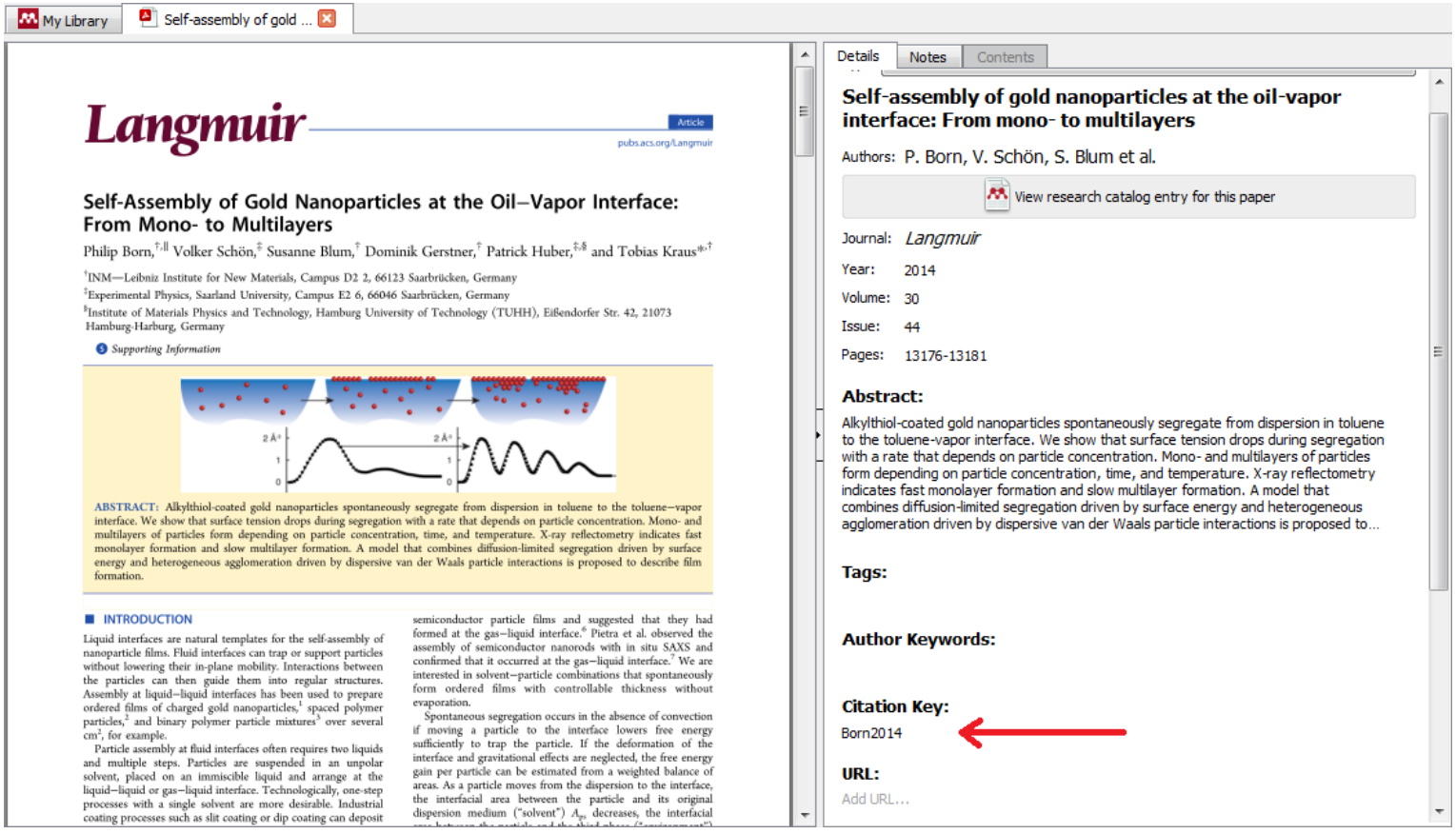
# Referencing using Mendeley

There are several methods for citations and referencing, with various complexity and flexibility

# Referencing using Mendeley

There are several methods for citations and referencing, with various complexity and flexibility

My personal favourite: using the program Mendeley:



# Referencing using Mendeley

There are several methods for citations and referencing, with various complexity and flexibility

My personal favourite: using the program Mendeley:

```
Mendeley exports all your references in the
   correct format for \LaTeX. You can then
  cite a paper using the ‘cite’ command
  like this \cite{Born2014}.

\bibliographystyle{ieeetr}
\bibliography{mybibliographyfile}
```

Mendeley exports all your references in the correct format for LaTeX. You can then cite a paper using the ‘cite’ command like this [1].

## References

[1] P. Born, V. Schön, S. Blum, D. Gerstner, P. Huber, and T. Kraus, “Self-assembly of gold nanoparticles at the oil-vapor interface: From mono- to multilayers,” *Langmuir*, vol. 30, no. 44, pp. 13176–13181, 2014.

# Some final notes

- It takes some getting used to, but don't give up to soon

# Some final notes

- It takes some getting used to, but don't give up to soon
- It sounds a lot more complicated than it is

# Some final notes

- It takes some getting used to, but don't give up to soon
- It sounds a lot more complicated than it is
- Google is your friend

# Some final notes

- It takes some getting used to, but don't give up to soon
- It sounds a lot more complicated than it is
- Google is your friend
- The best way of learning is by trying things out

# Reader and exercises

- The reader for *Pimp your thesis* can be found on ussproton.nl under the tab ‘bestanden’

# Reader and exercises

- The reader for *Pimp your thesis* can be found on ussproton.nl under the tab ‘bestanden’
- There are basic and advanced exercises to practise with, for solutions you can ask us or check the website later

# Reader and exercises

- The reader for *Pimp your thesis* can be found on ussproton.nl under the tab ‘bestanden’
- There are basic and advanced exercises to practise with, for solutions you can ask us or check the website later
- For those who do not have LaTeX installed we recommend using Overleaf.com

# Reader and exercises

- The reader for *Pimp your thesis* can be found on ussproton.nl under the tab ‘bestanden’
- There are basic and advanced exercises to practise with, for solutions you can ask us or check the website later
- For those who do not have LaTeX installed we recommend using Overleaf.com
- Trying out your own things and/or asking questions is encouraged!

Good luck!

Any questions?