The beamer class for LaTeX

– A Tutorial –

Kathrin Wünsch

Centre for Fusion, Space and Astrophysics
Department of Physics
University of Warwick

Workshop, University of Warwick, 23rd April 2012

Outline

Outline

Why Beamer?

Advantages:

- Standard LaTeX commands work for Beamer: you can write basic LaTeX, you can easily make a Beamer presentation
- Final output is usually a pdf file:
  → compatible with all operating systems (MAC, Unix, Windows);
- You can easily create overlays and dynamic effects;
- Mathematical formula look neater and can be copied directly from a written LaTeX document;
- Beamer comes with a wide range of predefined themes.

Disadvantages:

- Not as "point-and-click" as PowerPoint;
- Basic knowledge of LaTeX is required.

Outline

A first example

```
\documentclass{beamer}
\title {A first example}
\author{author}
\date{\today}

\begin{document}

  \frame{\titlepage}
  \begin{frame}
  \frametitle{First Slide}
   Contents of first slide
  \end{frame}

\end{document}
```

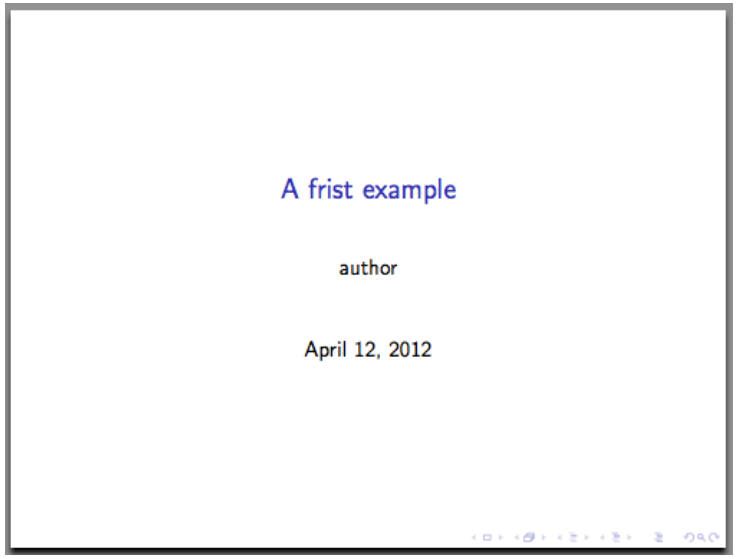
A first example

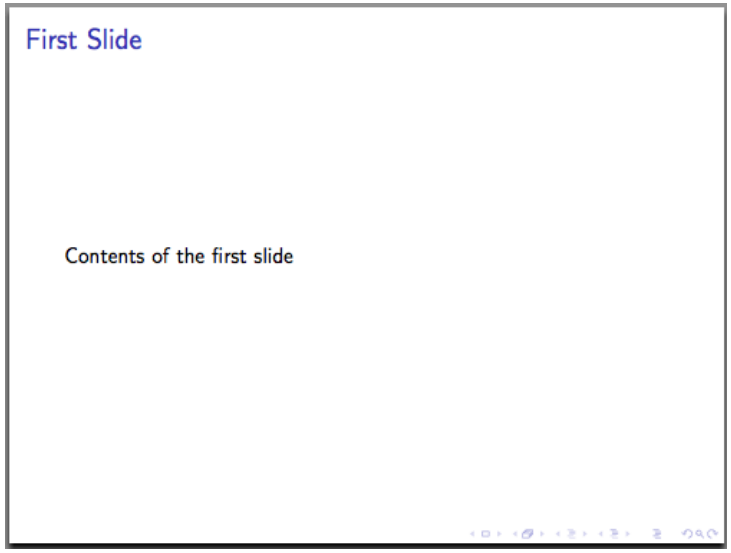
```
\documentclass{beamer}
\title {A first example}
\author{author}
\date{\today}

\begin{document}

  \frame{\titlepage}
  \begin{frame}
  \frametitle{First Slide}
   Contents of first slide
  \end{frame}

\end{document}
```





Basic Code I

Load of Beamer class

```
\documentclass[option]{beamer}
```

Options are:

- 8pt & 9pt (too small), 10pt, 11pt, 12pt, 14pt, 17pt, 20pt (huge)
- handout - no overlays

  ```
  \usepackage{pgfpages}
  \pgfpagesuselayout{2 on 1}[a4paper,border shrink=5mm]
  ```

  (alternative: '4 on 1')
- draft - graphics, headlines, footlines are replaces by gray rectangles to speed up compiling

The beamer class automatically loads some other LaTeXpackages, e.g. `xcolor, amsmath, amsthm, hyperref`.

Basic Code II - The Frame

Subtitle

A frame defines one “page” (slide) of the presentation.

A Basic Frame

```
\begin{frame}[option]
   \frametitle{Basic Code II - The Frame} % Bookmark info
   \framesubtitle{Subtitle}               % Bookmark info
     Frame content
\end{frame}
```

Options are:

- plain - no headlines, footlines, sidebars
- b, c or t - vertically align at bottom, center or top
- fragile - require for verbatim environment
- shrink=0..100 - shrink everything by n percent
- ...

Basic Code II - Sections & Subsections

- You can structure the presentation using the usual LaTeXcommands `\section` and `\subsection` before the frame environment

```
\section[short title]{long title}
\subsection[short title]{long title}
\begin{frame}
.
.
.
```

- each call of them creates:
  1. a new entry into the Table of Contents
  2. insert a new entry into the navigation bars (in many themes)
  3. does not generate a frame heading or any text on the slide
- the version `\section*[]{}` adds only an entry in the navigation bars, but not in the Table of Contents

Basic Code III - Special Frame: Title

```
\title[short version]{A long Title \\ over several lines}
\subtitle[short version]{Subtitle}
\date[2009]{Event, \today}
\author[M. Smith]{Michael Mike Smith}
\institute[Uni Warwick]{University of Warwick}
\logo{\includegraphics[scale=0.1]{logo}}
\titlegraphic{\includegraphics[scale=0.1]{graphics}}

\begin{document}
\frame{\titlepage} % <-- generate frame with title
```

- short versions of title, authors, ... are used for head- and footlines
- several authors with several affiliations:

```
\author[author1 et al.]{author1\inst{1} \and author2\inst{2}}
\institute[Location1 and Location 2]{
\inst{1} Location long 1 \and
\inst{2} Location long 2}
```

Basic Code III - Special Frame: Table of contents

Creating table of contents:

```
\frame{\frametitle{Outline}\tableofcontents[pausesections]}
```

`[pausesections]` is optional → create pause between the sections.

Note: You can automatically print the table of contents at the beginning of each section by adding the following code in the preamble:

```
\AtBeginSection[] {
   \begin{frame}
   \frametitle{Outline}
   \tableofcontents[currentsection]
\end{frame}}
```

Outline

Themes

For the appearance of the presentation you can select predefined **themes** of the BEAMER class. Thereby, BEAMER classifies five Categories:

Categories of Themes:

1. **Presentation Themes:** *slide template*
2. **Color Themes*:** *color scheme of slide template*
3. **Font Themes*:** *defines the fonts*
4. **Inner Themes*:** *defines inside of slide like of bullets, boxes, ect.*
5. **Outer Themes*:** *defines outside of slide like head- and footlines*

(* are optional if you don't like the default settings of Presentation themes)

Themes - Presentation Themes

Specifies the slide template of the entire presentation:

```
\usetheme[...]{Berkeley}
```

Presentation Themes (many are named after cities):

AnnArbor	Antibes	Bergen	Berkeley	Berlin
Boadilla	boxes	CambridgeUS	Copenhagen	Darmstadt
default	Dresden	Frankfurt	Goettingen	Hannover
Ilmenau	JuanLesPins	Luebeck	Madrid	Malmoe
Marburg	Montpellier	PaloAlto	Pittsburgh	Rochester
Singapore	Szeged	Warsaw		

Themes - Color Themes

Specifies the color themes of the slide template either complete or just for inner and outer elements:

```
\usecolortheme[...]{beaver}
```

Color Themes (many are named after animals):

complete:	albatross, beetle, crane, dove, fly, seagull, wolverine, beaver
inner:	lily, orchid, rose
outer:	whale, seahorse, dolphin

Note: Theme-Matrix presents various theme and color combinations:
`http://www.hartwork.org/beamer-theme-matrix/`

Themes - Inner Themes

Specifies the typesetting of elements within the frame such as:

- title and part pages
- itemize, enumeration & description environment
- block, theorem & proof environment
- figures and tables
- footnotes
- bibliography entries

```
\useinnertheme[...]{circles}
```

Inner Themes:

circles default inmargin rectangles rounded

Themes - Outer Themes

Specifies the the navigational elements such as:

- head- and footline
- sidebars
- logo
- frame title

```
\useoutertheme[...]{split}
```

Outer Themes:

default infolines miniframes sidebar smoothbars
smoothtree split tree

Themes - Font Themes

Specifies the the fonts used in a presentation:

```
\usefonttheme[...]{serif}
```

Font Themes:

default	professionalfonts	serif
structureitalicserif	structuresmallcapsserif	structurebold

⇒ All themes can be further customized by options `[...]` which can be found in the documentation included in the distribution of BEAMER.

⇒ The color/inner/outer & font themes are optional which can be selected if you don't like the default settings

⇒ More detailed adjustments are possible → check the documentation

Outline

Practical Tips - Workflow

Creating your presentation pdf file

1. Create a `main.tex` which contains
   - settings (i.e. required packages, themes specifications)
   - title specifications with title frame
   - table of contents frame
2. create the various frames separately and include them into the main document `main.tex` via the `\input{slide}` command
3. Compiling you `main.tex` twice using either
   - `pdflatex` (recommended) for `.png`, `.jpg`, `.jpeg` & `.pdf` graphics
   - `latex`, followed by `dvips` and `ps2pdf` for `.eps` & `.ps` graphics
4. Open the `.pdf` file with Acrobat, `xpdf`, `evince`, `skim`, ...

Hint:

- `pdflatex` works NOT together with the package `pstricks`
- Search for an editor supporting LaTeX, such as `texmaker`

Practical Tipps - Workflow

main.tex

```
\documentclass[10pt]{beamer}
\usetheme[compress]{Ilmenau}
\usepackage{listings}
⋮
\title[]{Title}
⋮
\begin{document}
\frame{\titlepage}
\frame{\frametitle{Outline}
    \tableofcontents[]}

% Start slides
\input{slide1.tex}
\input{slide2.tex}
⋮
\end{document}
```

slide1.tex

```
\begin{frame}[]
\frametitle{Title of slide 1}

    contents of slide 1

\end{frame}
```

slide2.tex

```
\begin{frame}[]
\frametitle{Title of slide 2}

    contents of slide 2

\end{frame}
                    ⋮
```

Exercise 1

1. Create the first example as shown in the presentation (use for the compiling `pdflatex` and have a look for the output).
2. Create a simple presentation with 3 frames/slides organised as shown in the Workflow. Thereby, the frames should be specified with two different sections.
3. Create a title page with title, subtitle, date, location and three different authors with two different affiliations.
4. Create a Table of Contents and let the Table of Contents re-appear in front of each new section.
5. Play a bit around with the different categories of the themes as presented in this presentation.

Outline

Environments I - Lists

$\Rightarrow$ Usual LaTeX environments are available

Itemize - environment

```
\begin{itemize}
   \item first item
   \item second item
\end{itemize}
```

- first item
- second item

Enumerate - environment

```
\begin{enumerate}
   \item first item
   \item second item
\end{enumerate}
```

1. first item
2. second item

Description - environment

```
\begin{description}
   \item[Item1] description
   \item[Item2] description
\end{description}
```

Item1 description

Item2 description

Environments II - Mathematics Blocks

$\Rightarrow$ Usual math LaTeX environments are available

Theorem

```
\begin{theorem}
...
\end{theorem}
```

Definition

```
\begin{definition}
...
\end{definition}
```

Lemma

```
\begin{lemma}
...
\end{lemma}
```

Corollary

```
\begin{corollary}
...
\end{corollary}
```

Proof.

```
\begin{proof}
...
\end{proof}
```

□

Example

```
\begin{example}
...
\end{example}
```

Environments II - Blocks

$\Rightarrow$ BEAMER offers additional block environments

A Block

```
\begin{block}{A Block}
...
\end{block}
```

A Alertbox

```
\begin{alertblock}{A Alertblock}
...
\end{block}
```

A Exampleblock

```
\begin{exampleblock}{A Exampleblock}
...
\end{block}
```

- Appearance of blocks, lists & environments is defined by template.
- The Title is mandatory. Use `\begin{block}{}...` for empty block.

Outline

Overlays

- Overlays control the order in which parts of the frame appear.

+ Helpful to focus the attention of the audience to the information that is currently being discussed.

– Don't overuse it: otherwise you'll end up to continuously run back to the computer to click to uncover the next part of your talk.

Overlays - Pause

Pause command

An easy (but unflexible) way to create overlays is the \pause command. If you use this command somewhere in the frame, only the text on the frame up to the \pause command is shown on the first slide. On the second slide, everything up to the second \pausem, and so forth.

1. Shown from first slide on.
2. Shown from second slide on.
3. Shown from third slide on.
4. Shown from fourth slide on.

```
\begin{enumerate}
\item Shown from first slide on.
\pause
\item Shown from second slide on.
\pause
\item Shown from third slide on.
\pause
\item Shown from fourth slide on.
\end{enumerate}
```

$\Rightarrow$ Can be used inside environments, mathematical equation & texts.

Overlays - Pause

Pause command

An easy (but unflexible) way to create overlays is the \pause command. If you use this command somewhere in the frame, only the text on the frame up to the \pause command is shown on the first slide. On the second slide, everything up to the second \pausem, and so forth.

1. Shown from first slide on.
2. Shown from second slide on.
3. Shown from third slide on.
4. Shown from fourth slide on.

```
\begin{enumerate}
\item Shown from first slide on.
\pause
\item Shown from second slide on.
\pause
\item Shown from third slide on.
\pause
\item Shown from fourth slide on.
\end{enumerate}
```

$\Rightarrow$ Can be used inside environments, mathematical equation & texts.

Overlays - Pause

Pause command

An easy (but unflexible) way to create overlays is the \pause command. If you use this command somewhere in the frame, only the text on the frame up to the \pause command is shown on the first slide. On the second slide, everything up to the second \pausem, and so forth.

1. Shown from first slide on.
2. Shown from second slide on.
3. Shown from third slide on.
4. Shown from fourth slide on.

```
\begin{enumerate}
\item Shown from first slide on.
\pause
\item Shown from second slide on.
\pause
\item Shown from third slide on.
\pause
\item Shown from fourth slide on.
\end{enumerate}
```

$\Rightarrow$ Can be used inside environments, mathematical equation & texts.

Overlays - Pause

Pause command

An easy (but unflexible) way to create overlays is the \pause command. If you use this command somewhere in the frame, only the text on the frame up to the \pause command is shown on the first slide. On the second slide, everything up to the second \pausem, and so forth.

1. Shown from first slide on.
2. Shown from second slide on.
3. Shown from third slide on.
4. Shown from fourth slide on.

```
\begin{enumerate}
\item Shown from first slide on.
\pause
\item Shown from second slide on.
\pause
\item Shown from third slide on.
\pause
\item Shown from fourth slide on.
\end{enumerate}
```

$\Rightarrow$ Can be used inside environments, mathematical equation & texts.

Overlays Specifications

- Overlays specifications are given in pointed brackets `<...>` which can be written behind certain commands.
- These specifications indicate which slide the corresponding information should appear on, as explained in the following:
  - `<2>` $\rightarrow$ display on slide 2.
  - `<1->` $\rightarrow$ display from slide 1 on.
  - `<1-3>` $\rightarrow$ display from slide 1 to slide 3.
  - `<-3, 5-6, 8->` $\rightarrow$ display on all slides except slides 4 and 7.

- Shown from first slide on.
- Shown from second slide on.
- Shown only in forth slide.
- Shown in 3., 5. and all further slides.

```
\begin{itemize}
 \item<1-> Shown from first slide on.
 \item<2-> Shown from second slide on.
 \item<4> Shown only in forth slide.
 \item<3,5-> Shown in 3., 5. and all
         further slides.
\end{itemize}
```

Overlays Specifications

- Overlays specifications are given in pointed brackets `<...>` which can be written behind certain commands.
- These specifications indicate which slide the corresponding information should appear on, as explained in the following:
  - `<2>` $\rightarrow$ display on slide 2.
  - `<1->` $\rightarrow$ display from slide 1 on.
  - `<1-3>` $\rightarrow$ display from slide 1 to slide 3.
  - `<-3, 5-6, 8->` $\rightarrow$ display on all slides except slides 4 and 7.

- Shown from first slide on.
- Shown from second slide on.
- Shown only in forth slide.
- Shown in 3., 5. and all further slides.

```
\begin{itemize}
 \item<1-> Shown from first slide on.
 \item<2-> Shown from second slide on.
 \item<4> Shown only in forth slide.
 \item<3,5-> Shown in 3., 5. and all
         further slides.
\end{itemize}
```

Overlays Specifications

- Overlays specifications are given in pointed brackets `<...>` which can be written behind certain commands.
- These specifications indicate which slide the corresponding information should appear on, as explained in the following:
  - `<2>` $\rightarrow$ display on slide 2.
  - `<1->` $\rightarrow$ display from slide 1 on.
  - `<1-3>` $\rightarrow$ display from slide 1 to slide 3.
  - `<-3, 5-6, 8->` $\rightarrow$ display on all slides except slides 4 and 7.

- Shown from first slide on.
- Shown from second slide on.
- Shown only in forth slide.
- Shown in 3., 5. and all further slides.

```
\begin{itemize}
 \item<1-> Shown from first slide on.
 \item<2-> Shown from second slide on.
 \item<4> Shown only in forth slide.
 \item<3,5-> Shown in 3., 5. and all
         further slides.
\end{itemize}
```

Overlays Specifications

- Overlays specifications are given in pointed brackets `<...>` which can be written behind certain commands.
- These specifications indicate which slide the corresponding information should appear on, as explained in the following:
  - `<2>` $\rightarrow$ display on slide 2.
  - `<1->` $\rightarrow$ display from slide 1 on.
  - `<1-3>` $\rightarrow$ display from slide 1 to slide 3.
  - `<-3, 5-6, 8->` $\rightarrow$ display on all slides except slides 4 and 7.

- Shown from first slide on.
- Shown from second slide on.
- Shown only in forth slide.
- Shown in 3., 5. and all further slides.

```
\begin{itemize}
 \item<1-> Shown from first slide on.
 \item<2-> Shown from second slide on.
 \item<4> Shown only in forth slide.
 \item<3,5-> Shown in 3., 5. and all
          further slides.
\end{itemize}
```

Overlays Specifications

- Overlays specifications are given in pointed brackets `<...>` which can be written behind certain commands.
- These specifications indicate which slide the corresponding information should appear on, as explained in the following:
  - `<2>` $\rightarrow$ display on slide 2.
  - `<1->` $\rightarrow$ display from slide 1 on.
  - `<1-3>` $\rightarrow$ display from slide 1 to slide 3.
  - `<-3, 5-6, 8->` $\rightarrow$ display on all slides except slides 4 and 7.

- Shown from first slide on.
- Shown from second slide on.
- Shown only in forth slide.
- Shown in 3., 5. and all further slides.

```
\begin{itemize}
 \item<1-> Shown from first slide on.
 \item<2-> Shown from second slide on.
 \item<4> Shown only in forth slide.
 \item<3,5-> Shown in 3., 5. and all
         further slides.
\end{itemize}
```

Overlays Specifications - Example

Example Code

```
\alert{Alert on all slides.}
\alert<2>{Alert on slide 2}
\alert<3>{Alert on slide 3}
\alert<1,3>{Alert on slides 1 and 3}
\alert<-2,4>{Alert on slides 1,2 and 4}
```

Result from Code

Alert on all slides.
Alert on slide 2
Alert on slide 3
Alert on slides 1 and 3
Alert on slides 1,2 and 4

Overlays Specifications - Example

Example Code

```
\alert{Alert on all slides.}
\alert<2>{Alert on slide 2}
\alert<3>{Alert on slide 3}
\alert<1,3>{Alert on slides 1 and 3}
\alert<-2,4>{Alert on slides 1,2 and 4}
```

Result from Code

Alert on all slides.
Alert on slide 2
Alert on slide 3
Alert on slides 1 and 3
Alert on slides 1,2 and 4

Overlays Specifications - Example

Example Code

```
\alert{Alert on all slides.}
\alert<2>{Alert on slide 2}
\alert<3>{Alert on slide 3}
\alert<1,3>{Alert on slides 1 and 3}
\alert<-2,4>{Alert on slides 1,2 and 4}
```

Result from Code

Alert on all slides.
Alert on slide 2
Alert on slide 3
Alert on slides 1 and 3
Alert on slides 1,2 and 4

Overlays Specifications - Example

Example Code

```
\alert{Alert on all slides.}
\alert<2>{Alert on slide 2}
\alert<3>{Alert on slide 3}
\alert<1,3>{Alert on slides 1 and 3}
\alert<-2,4>{Alert on slides 1,2 and 4}
```

Result from Code

Alert on all slides.
Alert on slide 2
Alert on slide 3
Alert on slides 1 and 3
Alert on slides 1,2 and 4

Overlays Specifications - Commands

Overlay Specification can be used with these commands:

Commands for Overlay Specifications

`\textbf<2>{Sample}`	Sample
`\textit<2>{Sample}`	Sample
`\textsl<2>{Sample}`	Sample
`\alert<2>{Sample}`	Sample
`\textrm<2>{Sample}`	Sample
`\textsf<2>{Sample}`	Sample
`\color<2>{green}{Sample}`	Sample
`\structure<2>{Sample}`	Sample

Note: Effect of each command will only appear on the second slide

Overlays Specifications - Commands

Overlay Specification can be used with these commands:

Commands for Overlay Specifications

`\textbf<2>{Sample}`	**Sample**
`\textit<2>{Sample}`	*Sample*
`\textsl<2>{Sample}`	*Sample*
`\alert<2>{Sample}`	Sample
`\textrm<2>{Sample}`	Sample
`\textsf<2>{Sample}`	Sample
`\color<2>{green}{Sample}`	Sample
`\structure<2>{Sample}`	Sample

Note: Effect of each command will only appear on the second slide

Special commands with Overlay Specifications I

The following commands have special overlay specifications which affect the text within the brackets {} or behind the command:

Special commands with Overlay Specifications I

`\onslide<>{}`	Text will only be shown on the specified slides. On non-specified slides, text still occupies the space.
`\only<>{}`	Text only appears on specified slides. On non-specified slides text will occupy no space.
`\uncover<>{}`	Text will only be shown on specified slides. On non-specified slides, text still occupies the space and appears transparent if transparency effects are enabled.
`\visible<>{}`	Text will be shown on specified slides. On the other slides, text is not shown but occupies still the space.
`\invisible<>{}`	Opposite to `\visible`.

Special commands with Overlay Specifications II

Special commands with Overlay Specifications II

- `\alt<n>{default text}{alternative text}`
  The default text is shown on the specified slides, otherwise the alternative text.
- `\temporal<>{before slide}{default text}{after slide}`
  This command takes three text arguments. The first text appears if the current slide is before the specified slides, the default text appears while currently on the specified slides, the last text appears after the specified slides have appeared.

Example of `temporal` command:

```
\temporal<2-3>{Shown on slide 1}{Shown on slide 2, 3}{Shown 4, ...}
```

Slide 1: Shown on slide 1

Special commands with Overlay Specifications II

Special commands with Overlay Specifications II

- `\alt<n>{default text}{alternative text}`
  The default text is shown on the specified slides, otherwise the alternative text.
- `\temporal<>{before slide}{default text}{after slide}`
  This command takes three text arguments. The first text appears if the current slide is before the specified slides, the default text appears while currently on the specified slides, the last text appears after the specified slides have appeared.

Example of `temporal` command:

```
\temporal<2-3>{Shown on slide 1}{Shown on slide 2, 3}{Shown 4, ...}
```

Slide 2: Shown on slide 2, 3

Special commands with Overlay Specifications II

Special commands with Overlay Specifications II

- `\alt<n>{default text}{alternative text}`
  The default text is shown on the specified slides, otherwise the alternative text.
- `\temporal<>{before slide}{default text}{after slide}`
  This command takes three text arguments. The first text appears if the current slide is before the specified slides, the default text appears while currently on the specified slides, the last text appears after the specified slides have appeared.

Example of `temporal` command:

```
\temporal<2-3>{Shown on slide 1}{Shown on slide 2, 3}{Shown 4, ...}
```

Slide 3: Shown on slide 2, 3

Special commands with Overlay Specifications II

Special commands with Overlay Specifications II

- `\alt<n>{default text}{alternative text}`
  The default text is shown on the specified slides, otherwise the alternative text.
- `\temporal<>{before slide}{default text}{after slide}`
  This command takes three text arguments. The first text appears if the current slide is before the specified slides, the default text appears while currently on the specified slides, the last text appears after the specified slides have appeared.

Example of `temporal` command:

```
\temporal<2-3>{Shown on slide 1}{Shown on slide 2, 3}{Shown 4, ...}
```

Slide 4: Shown 4, ...

Overlay Specifications - Environments

⇒ Environments can also be equipped with overlay specifications:

Theorem

There exists an infinite set.

Proof.

This follows from the axiom of infinity. □

Example

The set of natural numbers is infinite.

```
\begin{theorem}<1->
There exists an infinite set.
\end{theorem}

\begin{proof}<3->
This follows from the axiom of
infinity.
\end{proof}

\begin{example}<2->
The set of natural numbers is
infinite.
\end{example}
```

Note: For each of the basic commands `\only`, `\uncover`, `\invisible` and `\alt` there exists "environment versions": `onlyenv`, `altenv`, `visibleenv`, `uncoverenv` & `invisibleenv`.

Overlay Specifications - Environments

⇒ Environments can also be equipped with overlay specifications:

Theorem

There exists an infinite set.

Proof.

This follows from the axiom of infinity. □

Example

The set of natural numbers is infinite.

```
\begin{theorem}<1->
There exists an infinite set.
\end{theorem}

\begin{proof}<3->
This follows from the axiom of
infinity.
\end{proof}

\begin{example}<2->
The set of natural numbers is
infinite.
\end{example}
```

Note: For each of the basic commands `\only`, `\uncover`, `\invisible` and `\alt` there exists "environment versions": `onlyenv`, `altenv`, `visibleenv`, `uncoverenv` & `invisibleenv`.

Overlay Specifications - Environments

⇒ Environments can also be equipped with overlay specifications:

Theorem

There exists an infinite set.

```
\begin{theorem}<1->
There exists an infinite set.
\end{theorem}
```

Proof.

This follows from the axiom of infinity. □

```
\begin{proof}<3->
This follows from the axiom of
infinity.
\end{proof}
```

Example

The set of natural numbers is infinite.

```
\begin{example}<2->
The set of natural numbers is
infinite.
\end{example}
```

Note: For each of the basic commands `\only`, `\uncover`, `\invisible` and `\alt` there exists "environment versions": `onlyenv`, `altenv`, `visibleenv`, `uncoverenv` & `invisibleenv`.

Overlay Specifications - Environments

⇒ Environments can also be equipped with overlay specifications:

Theorem

There exists an infinite set.

```
\begin{theorem}<1->
There exists an infinite set.
\end{theorem}
```

Proof.

This follows from the axiom of infinity. □

```
\begin{proof}<3->
This follows from the axiom of
infinity.
\end{proof}
```

Example

The set of natural numbers is infinite.

```
\begin{example}<2->
The set of natural numbers is
infinite.
\end{example}
```

Note: For each of the basic commands `\only`, `\uncover`, `\invisible` and `\alt` there exists "environment versions": `onlyenv`, `altenv`, `visibleenv`, `uncoverenv` & `invisibleenv`.

Overlay Specifications - Environments

⇒ Environments can also be equipped with overlay specifications:

Theorem

There exists an infinite set.

```
\begin{theorem}<1->
There exists an infinite set.
\end{theorem}
```

Proof.

This follows from the axiom of infinity. □

```
\begin{proof}<3->
This follows from the axiom of
infinity.
\end{proof}
```

Example

The set of natural numbers is infinite.

```
\begin{example}<2->
The set of natural numbers is
infinite.
\end{example}
```

Note: For each of the basic commands `\only`, `\uncover`, `\invisible` and `\alt` there exists "environment versions": `onlyenv`, `altenv`, `visibleenv`, `uncoverenv` & `invisibleenv`.

Overlay Specifications - Transparency Effects

$\Rightarrow$ By default, covered items are not shown during a presentation.

Transparency Effects

Transparency effects can be specified in a quite general way by using the command in the preamble: `\setbeamercovered{options}`

Options are:

- invisible: default - covered text is completely transparent
- transparent: covered text is typeset in a transparent way (opaqueness can be specified - check documentation)
- dynamic: covered text is transparent in dynamic way, i.e. the longer it will take till the text is uncovered, the stronger the transparency.
- highly dynamic: same effect as dynamic, but the effect is stronger.
- ...

Outline

Let's have another break: Exercise 2

1. Add a new frame to your already created presentation and create a simple `block` without a title, and an `alertblock` with a title.
2. Add another frame and generate overlays using `itemize` environment with a) the `pause` command and b) overlay specifications.
3. Write down in a new frame the following sentences:
   - This is the first sentence in the frame.
   - This is the second sentence in the frame.
   - This is the third sentence in the frame.
   - End of overlays.

   and use the various commands `only`, `onslide`, `uncover`, `visible` and `invisible` to generate overlays. In particular observe the differences between `only` and `visible`. For a better understanding enable transparency effect by using the command `\setbeamercovered{highly dynamic}` in the preamble.

Outline

Including Graphics

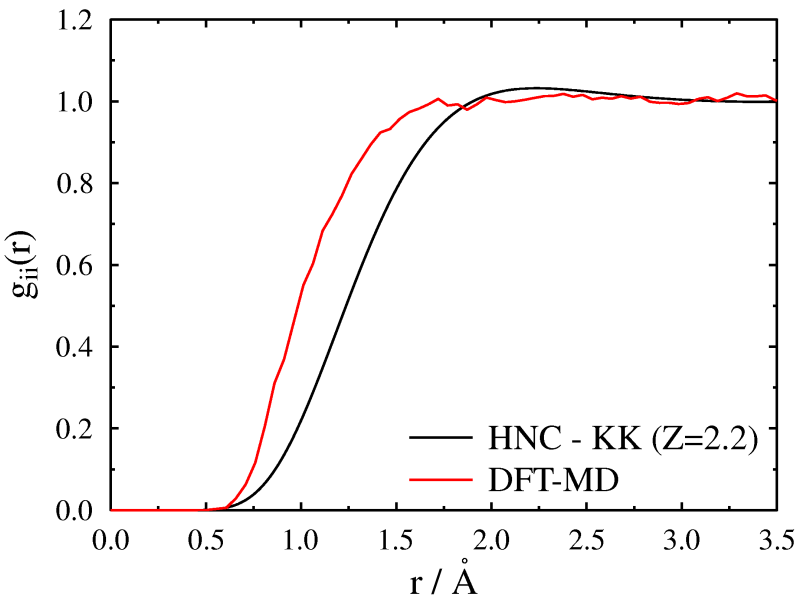
- Standard LaTeX figure environment can be used
  → `\includegraphics[options]{filename}`

  Options are:

  - `scale=<value>`: scale the picture by <value>
  - `height=<len>`: scale the picture so that the width is <len>
  - `width=<len>`: scale the picture so that the width is <len>
  - `angle=<x>`: rotate the picture by <x> degrees
  - `draft`: Don't display image, print filename in a box of the same size.
  - ...
- Beamer also supports the pgf package
  - → `\pgfdeclareimage[options]{image name}{filename}`
  - → `\pgfuseimage{image name}`
  - → `\pgfimage[options]{image name}`
- the commands `\includegraphics`, `\pgfuseimage`, and `\pgfimage` can be combined with overlay specification

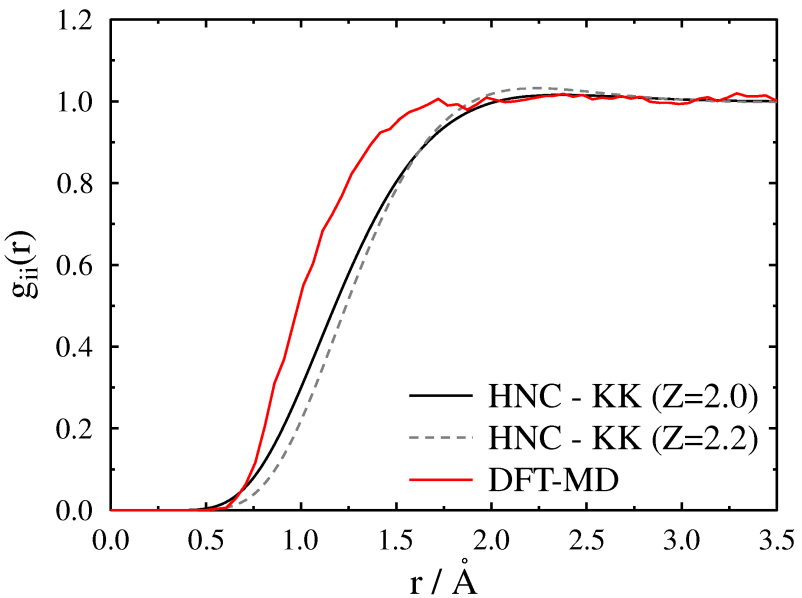
Including Graphics - Example

```
\only<1>{\includegraphics[scale=0.3]{fig_1}}%
\only<2>{\includegraphics[scale=0.3]{fig_2}}%
\only<3>{\includegraphics[scale=0.3]{fig_3}}%
\only<4->{\includegraphics[scale=0.3]{fig_4}}%
```



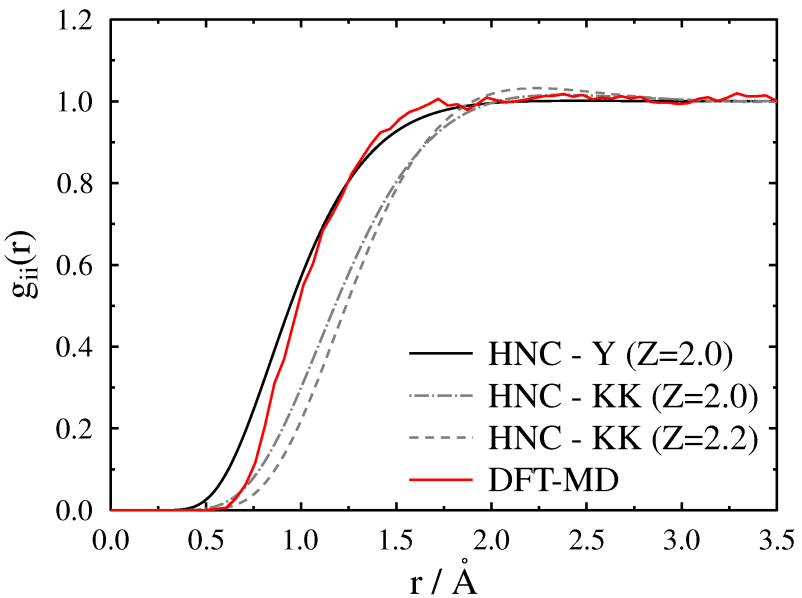
Including Graphics - Example

```
\only<1>{\includegraphics[scale=0.3]{fig_1}}%
\only<2>{\includegraphics[scale=0.3]{fig_2}}%
\only<3>{\includegraphics[scale=0.3]{fig_3}}%
\only<4->{\includegraphics[scale=0.3]{fig_4}}%
```



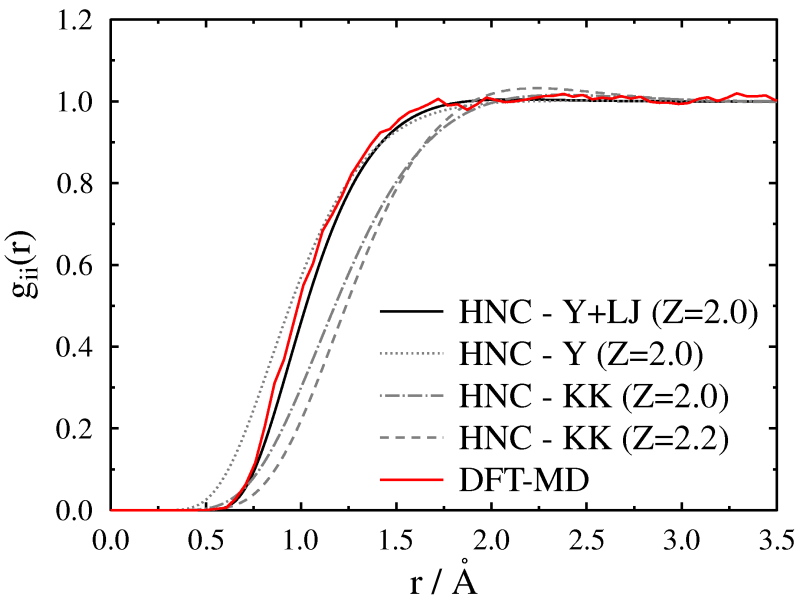
Including Graphics - Example

```
\only<1>{\includegraphics[scale=0.3]{fig_1}}%
\only<2>{\includegraphics[scale=0.3]{fig_2}}%
\only<3>{\includegraphics[scale=0.3]{fig_3}}%
\only<4->{\includegraphics[scale=0.3]{fig_4}}%
```



Including Graphics - Example

```
\only<1>{\includegraphics[scale=0.3]{fig_1}}%
\only<2>{\includegraphics[scale=0.3]{fig_2}}%
\only<3>{\includegraphics[scale=0.3]{fig_3}}%
\only<4->{\includegraphics[scale=0.3]{fig_4}}%
```



Note: You don't have to specify the file type of the graphics.

Outline

Columns

To structure the frame you can use

- LaTeX minipage environments
- Beamer columns environments

```
\begin{columns}
     \begin{column}[]{.5\textwidth}
         \begin{block}{Block 1} Contents of Block 1\end{block}
       \end{column}

     \begin{column}[]{.5\textwidth}
         \begin{block}{Block 2} Contents of Block 2\end{block}
      \end{column}
\end{columns}
```

Block 1

Contents of Block 1

Block 2

Contents of Block 2

Alignments & Spacings

- A frame can be assigned a left, center, or right alignment with the `flushleft`, `center` and `flushright` environments

```
\begin{center}
The center-aligned text goes here.
\end{center}
```

Cent aligned Example

The center-aligned text goes here.

- A vertical or horizontal space can be indicated by using `\vspace{0.5cm}` and `\hspace{0.5cm}`, respectively.
- Several units can be used, e.g, mm, cm, in, pt, ...
- Also negative values can be used to squeeze text or graphics together: `\vspace{-0.5cm}`

Outline

Tips for Professional Tables

Simple tables can be created in BEAMER with the `tabular` environment:

```
\begin{tabular}[position]{table spec}
⋮
\end{tabular}
```

The following symbols are available to describe the table columns:

`l`	left-justified column
`c`	centered column
`r`	right-justified column
`p{width}`	paragraph column with text vertically aligned at the top
`|`	vertical line
`||`	double vertical line

Note: LaTeX won't wrap the text in a column if it is too wide for the page. With `p{width}` you can define the width of the column and the text will be wrap-around.

Tips for Professional Tables - Examples

label 1	label 2	label 3
cell 1	cell 2	cell 3
cell 4	cell 5	cell 6

```
\begin{tabular}{c|c|c}
\hline
label 1 & label 2 & label 3 \\
\hline\hline
cell 1 & cell 2 & cell 3 \\
cell 4 & cell 5 & cell 6 \\
\hline
\end{tabular}
```

For more professional looking tables use the `booktabs` package:
e.g. it provides the commands `\toprule`, `\midrule` & `\bottomrule`.

label 1	label 2	label 3
cell 1	cell 2	cell 3
cell 4	cell 5	cell 6

```
\begin{tabular}{c|c|c}
\toprule
label 1 & label 2 & label 3 \\
\midrule
cell 1 & cell 2 & cell 3 \\
cell 4 & cell 5 & cell 6 \\
\bottomrule
\end{tabular}
```

Outline

And, Finally ....

This presentation shows only a fraction of BEAMER's capability.

Other useful thinks:

- Adding notes to the pdf → `\documentclass[notes]{beamer}`
- Drawing figures using e.g.:
  - the LaTeX picture environment
  - `pstricks` package: cannot use `pdflatex` with this
- Animations, Sounds & Multimedia → `\usepackage{multimedia}`
- Adding a Bibliography & Appendix

⇒ **References:**

- Beamer User Guide:
  `http://sourceforge.net/projects/latex-beamer/`
- Web: if you think BEAMER should be able to do it, google it!