# The **spot** package: spotlight highlighting for Beamer\*

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#### 1 Introduction

Beamer's \alert command is designed to call the viewer's attention to certain parts of the slide, but under some circumstances it can be less effective than desired. First, because the actual colors produced depend on the projector hardware used and the ambient lighting in the room, you can find to your dismay that the color change provided by \alert is barely discernible onscreen. Of course you can fiddle with \setbeamercolor{alerted text}{ $\langle color \rangle$ } to achieve better results on your own projector, but you may still face surprises when taking your presentation to another institution. Moreover, the \alert command is often ineffective at highlighting just one or two characters on a full slide; in such a situation, a color change alone may not be striking enough to draw the viewer's eye. For just such circumstances, this package provides a \spot command to paint a "spotlight" of color painted behind the highlighted text, as in this example.

# 2 Usage

#### 2.1 General Usage

\spot The \spot command has the following syntax:

 $\spot <\langle overlay \ spec \rangle > (\langle node \ name \rangle) [\langle node \ options \rangle] \{\langle highlighted \ text \rangle\}$ 

The first three parameters, <(overlay spec)>, ((node name)), and [(node options)], are optional, and any combination of them may be omitted, but their order must not change. For example, \spot<5->[fill=red]{George} is legal, but entering \spot[star](mynode){Joe} will produce erroneous output.

<sup>\*</sup>This document corresponds to spotlight v1.1, dated 2011/05/09.

The (overlay spec) should be a standard Beamer overlay specification; for example, \spot<2-3>{Fred} highlights the word "Fred" only on slides 2 and 3. The actual "spotlight" shape is a TikZ node. If you wish to access the node later—for example, to point an arrow at it—you can specify a (node name). Consider the following example:

We can draw an arrow sentence to the last.

\spot(first){We} can draw an from the first word of this arrow from the first word of this sentence to the \spot(last){last}. \tikz[remember picture, overlay]{ \draw (first) to [->] (last);}

The default behavior of \spot is to surround its argument with a gold-colored ellipse, most intense at its center and fading towards the edges. That behavior can be altered—for example, to change the shape or color—for a specific instance of \spot by specifying  $\langle node\ options \rangle$ . Consider the following example:

To be, or not to be: that is the question.

To \spot\*[fill=blue!50]{be,} or not to \spot\*[star, star points=8]{be:} that \spot\*[ball color=red]{is} the \spot\*[path fading=east]{question.}

For a complete understanding of possible (node options), please see the PGF/TikZ documentation. Of particular note is that path fading=none will eliminate the fading, causing the node to overlap urrounding text. To change the default behavior for subsequent calls to \spot, the following commands are provided.

The command  $\setspotlightcolor{\langle color \rangle}$  makes all subsequent invoca-\setspotlightcolor tions of \spot use the specified  $\langle color \rangle$ . The default shade of gold is named spotlightgold, and may be restored with the command \resetspotlightcolor. The current color is saved in the macro \spotlightcolor, making commands such as \setspotlightcolor{\spotlightcolor!50} possible. Note that if  $fill = \langle color \rangle$  is given in the  $\langle node\ options \rangle$  or with \setspotlightstyle, it takes precedence over the  $\langle color \rangle$  in \spotlightcolor.

> The command  $\setspotlightstyle{\langle node\ options\rangle}$  adds  $\langle node\ options\rangle$  to the nodes produced by all subsequent invocations of \spot. The effect of multiple calls is cumulative. Default options may be restored by \resetspotlightstyle. The current options are saved in the macro \spotlightnodeoptions.

\resetspotlightcolor \spotlightcolor

\setspotlightstyle \resetspotlightstyle \spotlightnodeoptions



\setspotlightcolor{red!50} \spot{A} \quad \setspotlightstyle{star, fill=green!50} \spot{B} \quad \setspotlightstyle{star points=7} \spot{C} \quad \resetspotlightstyle \spot{D} \quad \resetspotlightcolor \spot{E}

#### 2.2 Non-Beamer Usage

\spot\*

Although the spot package is chiefly designed for use with Beamer, it may also be used in documents of other classes. There are two peculiarities, however, the reasons for which will be explained in section 3. First, if \spot is used within a \parbox, a minipage environment, a header or footer, or a p column in a tabular environment, the error message "LaTeX Error: Float(s) lost" will result. The remedy is to use the the starred version \spot\* instead, and to follow the instructions in the following paragraph.

\dospots

Second, if the last call to \spot on a page is in math mode, in a TeX inner mode (such as a tabular environment), or the starred version \spot\*, then the command \dospots must be issued somewhere later on that same page, after the math mode or tabular or \parbox has ended. (The actual criterion is that \dospots must be able to call \marginpar, which cannot be done in those environments.) If the page ends before a \dospots is encountered, an error message will be generated.

\dospotsheader \dospotsfooter Remembering to place a \dospots after each problematic \spot can be a hassle. The best solution is to use the fancyhdr package to place the command \dospotsheader or its synonym \dospotsfooter into a header or footer appearing on every page, obviating the need for any manual \dospots. Moreover, if a spotlight is desired within a header, footer, or marginpar, \spot\* should be used and \dospotsheader or \dospotsfooter should follow.

### 3 Strategy

This section describes the mechanism spot uses to draw its spotlights. It would be simple enough to wrap the highlighted text within a TikZ node, keeping it in line with its surroundings, but the result is not perfect. The preceding highlighting was painted over previous text but under subsequent text, creating both an uneven effect and an unintentional emphasis on the beginning of the following word. The solution is to leave a blank space in the text, coming back once the entire frame has been typeset to draw the text and its highlighting over their surroundings.

Suppose then that  $\spot<2>\{foo\}$  is called in a Beamer frame. On slide 1 of the frame, the text foo is typeset as the sole node in a TikZ picture, with node op-

<sup>&</sup>lt;sup>1</sup>Produced with

tions chosen so that it occupies its place in the paragraph just like ordinary typeset text. The node is given a name such as spot@vii, and the remember picture option is used.

When slide 2 is typeset, the node spot@vii is drawn as before, except with opacity=0 so that it is transparent. After the contents of the entire slide are typeset, another TikZ picture uses the overlay option to return to the location of spot@vii and typeset foo in a node with a suitably eye-catching shape, fill color, and fading.

In Beamer, the code to paint the highlighted node is attached to \end{frame}. The challenge for implementing spot in classes other than Beamer is the lack of a hook for the end of a page; even the afterpage package cannot return to the previous page to typeset new material. The solution used is to insert the \spot@paintspot macro into a \marginpar. This is the source of the two peculiarities mentioned on page 3, for under certain circumstances, LATEX cannot process a \marginpar correctly. These circumstances include TEX's inner vertical mode, display math, and \parboxes. In these situations spot must save its painting commands for later. The command \dospots, called from a "safe" location, inserts those saved commands into a \marginpar. The alternative commands \dospotsheader and \dospotsfooter execute the saved paint commands immediately, making them suitable for inclusion in a header or footer. Because this second mechanism, though more reliable, places an extra burden on the user, it was not chosen as the default behavior for \spot.

The starred version \spot\* uses the second mechanism in place of the first. Moreover, the \spot macro will also switch to the second mechanism when it can detect the necessity. If \iffinner is true, then \marginpar would fail; likewise if \iffmode is true, then LATEX might well be in display math mode where \marginpar fails; in these situations, \spot acts like \spot\*. Unfortunately, if \spot is called within a \parbox, there is no test that can make \spot aware of that fact, and the user will see LaTeX Error: Float(s) lost. This warning is an indication that even LATEX itself could not tell in advance whether \marginpar would work properly or not.

# 4 Limitations and Tips

- Because \spot{foo} places the text foo in a TikZ node, it will not allow line breaks within foo. For highlighting that permits automatic line breaking, consider the \hl command of the soul package.
- The \spot command does not work well in a Beamer frame broken into multiple slides by allowframebreaks.
- In non-Beamer class, spotlights meant for the bottom of one page may sometimes show up at the bottom of the next page.
- It is possible to call  $\spot$  in math mode, but as the argument will be set in a box within a TikZ node, the results may need tinkering. For ex-

ample,  $a^{\spot}b$ } produces  $a^b$ , not  $a^b$ ; to make the superscript the correct size, you must write  $a^{\spot}\$ . Likewise to produce a=b requires writing  $a\$  produces the poorly spaced a=b.

• As mentioned in section 2.2, when using spot in a document class other than Beamer, it is best to include \dospotsheader in a header appearing on every page. A minimal solution is to put the following in the preamble:

```
\usepackage{fancyhdr}
\pagestyle{fancy}
\fancyhf{}
\rhead{\dospotsheader}
```

### 5 Implementation

#### 5.1 Packages and Hooks

The TikZ package must be loaded with the necessary libraries.

- 1 \RequirePackage{tikz}
- 2 \usetikzlibrary{shapes}
- 3 \usetikzlibrary{fadings}

We next check whether we are in the Beamer class or not, and we abbreviate \expandafter in the usual way.

- 4 \newif\ifspot@beamer
- 5 \@ifundefined{beamer@frameslide}{\spot@beamerfalse}{\spot@beamertrue}
- 6 \let\xa=\expandafter

In Beamer, we will need hooks for running code at the beginning and end of each frame. The commands \AtEveryBeginFrame and \AtEveryEndFrame store commands to be run in every frame, while the command \AtEndFrame applies only to the current frame. We repeat the last token of \beamer@frameslide, namely \beamer@checkframetitle, so that \beamer@frameslide can still detect the presence of a frame title.

- 7 \ifspot@beamer
- 8 \g@addto@macro\beamer@frameslide{\spot@everybeginframe@hook\beamer@checkframetitle}

Whereas \g@addto@macro makes it easy to add \spot@everybeginframe@hook to the end of the \begin{beamer@frameslide} code, adding hooks to be executed right before the existing \end{beamer@frameslide} code is a little more involved.

9 \let\spot@oldmaterial=\endbeamer@frameslide
10 \def\spot@newmaterial{%
11 \spot@endframe@hook%
12 \gdef\spot@endframe@hook{}%
13 \spot@everyendframe@hook}
14 \xa\xa\def
15 \xa\xa\endbeamer@frameslide

```
16 \xa\xa{%
17 \xa\spot@newmaterial\spot@oldmaterial}%
```

Having placed hooks into the beamer@frameslide environment, we now initialize those hooks as empty and create the commands \AtEndFrame, \AtEveryEndFrame, and \AtEveryBeginFrame.

```
18 \def\spot@endframe@hook{}
```

- 19 \def\spot@everyendframe@hook{}
- 20 \def\spot@everybeginframe@hook{}
- $21 \qquad \verb|\long\def\AtEndFrame#1{\g@addto@macro\spot@endframe@hook{#1}} |$
- 22 \long\def\AtEveryEndFrame#1{\g@addto@macro\spot@everyendframe@hook{#1}}
- 23 \long\def\AtEveryBeginFrame#1{\g@addto@macro\spot@everybeginframe@hook{#1}}

In classes other than Beamer, we will need the afterpage package to run code between pages.

```
24 \else
25 \RequirePackage{afterpage}
26 \fi
```

#### 5.2 Spotlight options

We next define the options. The \spotlightcolor macro stores the working color; it can be edited with the commands \setspotlightcolor and \resetspotlightcolor.

```
27 \def\spotlightcolor{spotlightgold}
28 \def\setspotlightcolor#1{\xdef\spotlightcolor{#1}}
29 \def\resetspotlightcolor{\gdef\spotlightcolor{spotlightgold}}
```

Likewise the command \spotlightnodeoptions stores additional node options chosen by the user. The command \setspotlightstyle adds to it, and \resetspotlightstyle empties it.

```
{\tt 30 \backslash def \backslash spotlight node options \{\}}
```

```
31 \def\setspotlightstyle#1{\g@addto@macro\spotlightnodeoptions{#1, }}
```

32 \def\resetspotlightstyle{\gdef\spotlightnodeoptions{}}

Finally, here are the default color and fading.

```
33 \definecolor{spotlightgold}{RGB}{255,204,51}
```

34 \tikzfading[name=spot@fade,

35 inner color=transparent!0,

outer color=transparent!60]

The count register \c@spot@spots numbers each spotlight on the frame or page.

```
37 \newcount\c@spot@spots
```

- 38 \c@spot@spots=1
- 39 \ifspot@beamer
- 40 \AtEveryBeginFrame{\global\c@spot@spots=1\relax}
- 41 \else
- 42 \afterpage{\global\c@spot@spots=1\relax}
- 43 \fi

#### 5.3 Input parsing

```
The macro \spot comes in starred and unstarred versions. We first check for the
                                   presence of the star, and set a flag if it is present.
                                   44 \neq 44 
                                   45 \spot@starfalse
                                   46 \def\spot{\@ifnextchar*{\spot@star}{\spot@nostar}}
                                   47 \def\spot@star#1{\global\spot@startrue\spot@nostar}
                                   As described in section 2, the full syntax of \spot is
    \spot@nostar
                                           \spot < (overlay spec) > ((node name)) [(node options)] {(highlighted text)}
                                   with each of \langle overlay \ spec \rangle, \langle node \ name \rangle, and \langle node \ options \rangle being optional. If
                                   any is not specified, we fill in the appropriate default value.
                                          The default overlay specification is <1->.
                                   48 \def\spot@nostar{%
                                             \@ifnextchar<{\spot@in}{\spot@in<1->}%
                                   50 }
                                   The default \langle node \ name \rangle is spot@dummynode.
             \spot@in
                                   51 \def\spot@in<#1>{%
                                            \@ifnextchar({\spot@inte<#1>}%
                                                                          {\spot@inte<#1>(spot@dummynode)}%
                                   53
                                   54 }
                                   The default is to have no extra \langle node\ options \rangle.
        \spot@inte
                                   55 \def\spot@inte<#1>(#2){%
                                             \@ifnextchar[{\spot@intern<#1>(#2)}{\spot@intern<#1>(#2)[]}%
                                   56
                                   57 }
                                   Because the spotlight is painted after the rest of the page is drawn, it is im-
    \spot@intern
                                   portant to expand the node options now (including \spotlightcolor and the
                                   user-defined \spotlightnodeoptions), so that they will not be affected by redef-
                                   initions later on the page. Note that the order of parameters is changed to make
                                   the \expandafters work.
                                   58 \def\spot@intern<#1>(#2) [#3] #4{%
                                             \edef\spot@totaloptions{fill=\spotlightcolor, \spotlightnodeoptions, #3}%
                                             \aligned \
                                   61 }
                                   Finally, we are ready to call the macros which actually do the work, depending on
\spot@internal
                                   whether we are running Beamer or some other class. We return the parameters
                                   to their normal order.
                                   62 \def\spot@internal[#1]<#2>(#3)#4{%
                                             \ifspot@beamer%
                                   64
                                                  \spot@internal@beamer<#2>(#3)[#1]{#4}%
                                   65
                                   66
                                                  \spot@internal@static<#2>(#3)[#1]{#4}%
                                             \fi%
                                   67
                                   68 }
```

#### 5.4 Beamer version

\spot@internal@beamer

The macro \spot@internal@beamer implements the \spot command when used in a Beamer presentation.

```
69 \def\spot@internal@beamer<#1>(#2) [#3]#4{%
```

The text to be highlighted is first saved in a box named something like \spot@box@vii, where the roman numeral represents the spot counter \c@spot@spots. In this way it will automatically have the correct font size and shape (italics, bold-face, etc.). It is set in math mode if necessary. For the sake of readability of the code, \spot@currentbox is let equal to \spot@box@vii.

Now we are ready to set the text. On the highlighted slides, we actually produce two TikZ nodes at this time. The first is merely a transparent copy of the text itself; the second is a transparent copy of the entire highlighted node shape, and receives the  $\langle node\ name \rangle$  called by the user. We require the first node (with the use as bounding box option) so as to fit the text seamlessly in line with its surroundings. The second node, bearing  $\langle node\ name \rangle$ , must be drawn now, so that the user can refer to  $\langle node\ name \rangle$  within the frame; the  $\langle node\ name \rangle$  could not simply be attached to the visible spotlight, since that is drawn with  $\land AfterEndFrame$ , after all the user's code has been processed. On unhighlighted slides, we simply draw an opaque copy of the text in a TikZ node.

```
\tikz[remember picture, baseline]{
78
      \alt<#1>{\path[use as bounding box]
79
                      node[anchor=base, inner sep=0, outer sep=0, opacity=0]
80
81
                      (spot@\romannumeral\c@spot@spots) {\usebox\spot@currentbox};
                \path (spot@\romannumeral\c@spot@spots)
82
                      node[anchor=center, outer sep=0,
83
                           shape=ellipse, inner sep=0.5ex,
84
                           #3, opacity=0] (#2) {\usebox\spot@currentbox};}
85
               {\path node[anchor=base, inner sep=0, outer sep=0, opacity=1]
86
87
                          (#2) {\usebox\spot@currentbox};}
88
      }%
```

Finally, we save the information needed to paint the spotlight at the end of the slide. Sometimes calling \AtEndFrame adds a little extra height to the frame's contents, which could cause a slight movement of the frame between highlighted and unhighlighted slides. We therefore make a call to \AtEndFrame on unhighlighted slides as well, to ensure that the same extra height be added even when we're not painting spotlights.

```
89 \alt<#1>{\xa\spot@savepaint\xa{\romannumeral\c@spot@spots}[#3]}%
90 {\AtEndFrame{\rule{0pt}}{0pt}}}%
```

Finally, we increment the counter \c@spot@spots and end the macro.

```
\global\advance\c@spot@spots by 1\relax%
92 }
```

#### \spot@savepaint

The following macro saves the actual spotlight-drawing command to be executed at the end of the slide. The first parameter is a roman numeral labeling the spotlight, while the second contains the node options.

```
93 \def\spot@savepaint#1[#2]{%
    \AtEndFrame{\spot@paintspot(spot@#1)[#2]{\usebox{\csname spot@box@#1\endcsname}}}%
95 }
```

#### \spot@paintspot

The command \spot@paintspot actually draws the spotlight at the saved location. Note that the first parameter is not the user-specified  $\langle node\ name \rangle$ , but an automatically generated name such as spot@vii.

```
96 \def\spot@paintspot(#1) [#2] #3{%
97
     \begin{tikzpicture}[remember picture, overlay, baseline]
         \path (#1) node[anchor=center, outer sep=0,
98
                          shape=ellipse, inner sep=0.5ex, text opacity=1,
gg
                          path fading=spot@fade, text=black, #2] {#3};
100
     \end{tikzpicture}%
101
102 }
```

#### non-Beamer version 5.5

To make the spotlight turn out correctly, it is vital to run \spot@paintspot after all surrounding text has been typeset. Whereas in Beamer the code can be attached to a hook in the \end{frame}, in other document classes we place the code in a \marginpar, which (being a T<sub>F</sub>X insertion) is typeset after the rest of the page. If \spot is called in certain TFX modes, however, \marginpar would produce an error. In this case, \spot saves up the commands to be placed into a \marginpar later.

#### \spot@savedpaintcommands \dospots

Whenever \spot is called, the \spot@paintspot commands will be saved up in the macro \spot@savedpaintcommands. A subsequent call to \dospots, by the user if necessary, executes those commands and resets the macro to empty.

```
103 \gdef\spot@savedpaintcommands{}
104 \def\dospots{%
     \marginpar{\spot@savedpaintcommands}%
105
     \gdef\spot@savedpaintcommands{}%
106
107 }
```

\dospotsfooter

\dospotsheader Since headers and footers are also TFX insertions, the \spot@savedpaintcommands could also be run there. The following commands are synonyms.

```
108 \def\dospotsheader{%
109
     \spot@savedpaintcommands%
     \gdef\spot@savedpaintcommands{}%
110
111 }
112 \let\dospotsfooter=\dospotsheader
```

\spot@internal@static Much of th

Much of the code in \spot@internal@static is identical with that of \spot@internal. The chief difference is that the overlay specification is completely ignored.

```
113 \def\spot@internal@static<#1>(#2) [#3]#4{%
114
     \@ifundefined{spot@box@\romannumeral\c@spot@spots}%
115
             {\xa\newbox\csname spot@box@\romannumeral\c@spot@spots\endcsname}{}}
116
     \ifmmode
117
       \global\xa\setbox\csname spot@box@\romannumeral\c@spot@spots\endcsname=\hbox{$#4$}%
118
     \else
119
       \global\xa\setbox\csname spot@box@\romannumeral\c@spot@spots\endcsname=\hbox{#4}%
     \fi
120
121
     \xa\let\xa\spot@currentbox\csname spot@box@\romannumeral\c@spot@spots\endcsname%
     \tikz[remember picture, baseline]{
122
        \path[use as bounding box]
123
               node[anchor=base, inner sep=0, outer sep=0, opacity=0]
124
               (spot@\romannumeral\c@spot@spots) {\usebox\spot@currentbox};
125
        \path (spot@\romannumeral\c@spot@spots)
126
                node[anchor=center, inner sep=0, outer sep=0,
127
                      shape=ellipse, inner sep=0.5ex,
128
129
                      #3, opacity=0] (#2) {\usebox\spot@currentbox};
130
       }%
     \xa\spot@static@savepaint\xa{\romannumeral\c@spot@spots}[#3]%
131
     \global\advance\c@spot@spots by 1\relax%
132
     \global\spot@starfalse%
133
134 }
```

\spot@static@savepaint

When \spot@static@savepaint is called, it first checks whether TeX is in an inner mode and/or math mode, and whether the starred version spot\* was used. If any of these three conditions holds, a call to \marginpar would likely fail, so the \marginpar command is saved to be executed by a \dospots command sometime later, and \spot@checkforlostspots will be run after the current page is processed. Otherwise, the appropriate \spot@paintspot command is immediately placed in a \marginpar, and any saved \marginpar commands are run at this time with \dospots. As with \spot@savepaint, the first parameter is the roman numeral identifying which spotlight is being painted, and the second contains the node options.

```
135 \def\spot@static@savepaint#1[#2]{%
     \def\spot@saveit{%
136
        \g@addto@macro\spot@savedpaintcommands{%
137
          \spot@paintspot(spot@#1)[#2]{\usebox{\csname spot@box@#1\endcsname}}}%
138
        \afterpage{\spot@checkforlostspots}%
139
     }%
140
     \ifspot@star
141
       \spot@saveit
142
143
     \else
       \ifinner
144
         \spot@saveit
145
146
        \else
147
         \ifmmode
148
            \spot@saveit
```

\spot@checkforlostspots

Between pages, the command \spot@checkforlostspots checks whether any \spot@paintspot commands were saved into \spot@savedpaintcommands but never executed by a \dospots. If so, it issues an error message to the user.

```
156 \def\spot@checkforlostspots{%
     \def\spot@empty{}%
157
     \ifx\spot@savedpaintcommands\spot@empty%
158
159
       \relax%
160
     \else%
161
       \bgroup
       \advance\count0 by -1
162
       \PackageError{spot}%
163
          {A \protect\dospots\space command is missing
164
165
           from page \the\count0.\MessageBreak
166
           Some highlighted text will not appear in the output}%
167
          {If the last \protect\spot\space command on a
           page is issued in math mode or a \MessageBreak
168
169
           TeX inner mode (such as a tabular environment),
           it must be followed by a \MessageBreak
170
171
           \protect\dospots\space command somewhere later
172
           on the page, outside such a mode.\MessageBreak
173
           You could also put \protect\dospotsheader\space
           in a header or footer on each page.}
175
       \egroup
     \fi%
176
177 }
```

# **Change History**

```
v1.0 v1.1 General: Fixed bug with Beamer's General: Initial version \dots 1 title command \dots 5
```