The size, shape, density and ring of the dwarf planet Haumea from a stellar occultation

J. L. Ortiz, P. Santos-Sanz, B. Sicardy, G. Benedetti-Rossi et al.

Tópicos de Ocultações no Sistema Solar, 2017 B

Physical characterization of Haumea using stellar occultation

Introdução

- The first consistent efforts for the prediction of stellar occultations by Pluto are described in Mink & Klemola (1985) and cover the period 1985-1990.
- McDonald & Elliot (2000a,b) prediction, now covering the period 1999-2009.

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Two important common limitations were the **astrometric precision of about only 0".2** and the lack of **stellar proper motions** leading to uncertainties on the order of the Earth radius for the predicted shadow paths. Also, these earlier predictions were degraded by **poorer precision of older ephemerides**, an issue which changed with the constant feed of new Pluto positions.

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To overcome these and other problems, we carried out an observational program at the ESO2p2/WFI instrument during 2007

- Estudar as propriedades de Pluto e suas luas é essencial para entender os Transnetunianos. Os quais são importantes para comprender a estrutura e evolução do Sistema Solar.
-

Color styles

These are some useful pre-defined color styles.

- This is alert.
- This is Alert.
- This is ALERT.
- This is comment.
- This is Comment.
- This is COMMENT.

Some colors like FlipGreen and FlipSand will automatically change tint when when you define light or dark backgrounds.

This makes it easier to swap between light/dark backgrounds by just modifying one option and recompiling.

The 'comment' styles are automatically footnote-sized.

Absolute placement

This slide demonstrates

- absolute placement of images using the `put` command in the `picture` environment.
- Note the overlap. Further, note that the particular depend on where the picture is defined.

  If you define the picture at the top of the slide, then it will have fixed coordinates (using the [t] alignment). The cost is that the image is then behind all the text.
- Beamer respects `png` and `pdf` transparencies.

Image: `http://www.smbc-comics.com/index.php?db=comics&id=2109`
Some alternatives for placing images: `http:`

`//www.texample.net/tikz/examples/transparent-png-overlay/`

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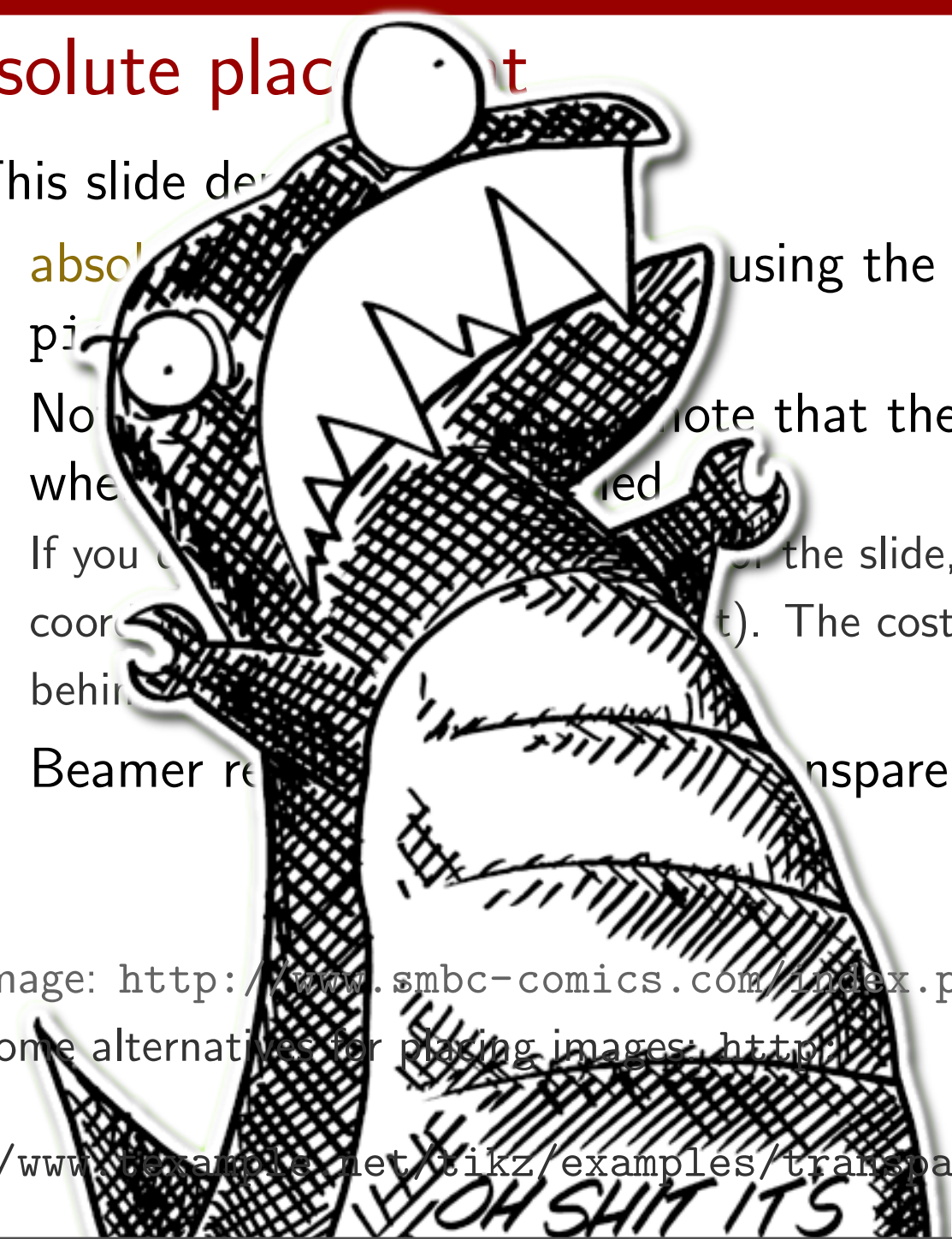

Image: http://www.smbc-comics.com/index.php?db=comics&id=2109

Some alternatives for placing images: http://

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Columns

Sometimes it's useful to split the screen

Test why is it gray?

Here's a column where I can write a bunch of things.

There are all sorts of things I can do in paragraph form.

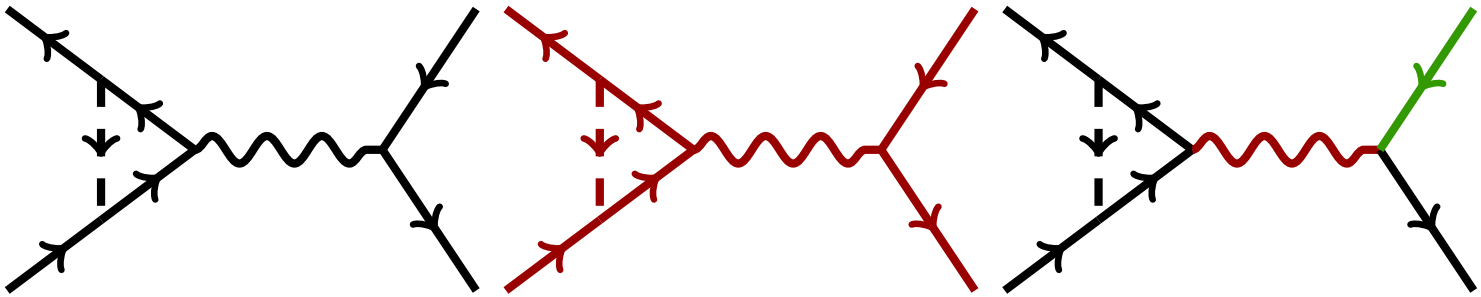
Blocks

...work in here too.

- Here's a column
- where I can itemize
- a bunch of things.

Sample Feynman Diagrams

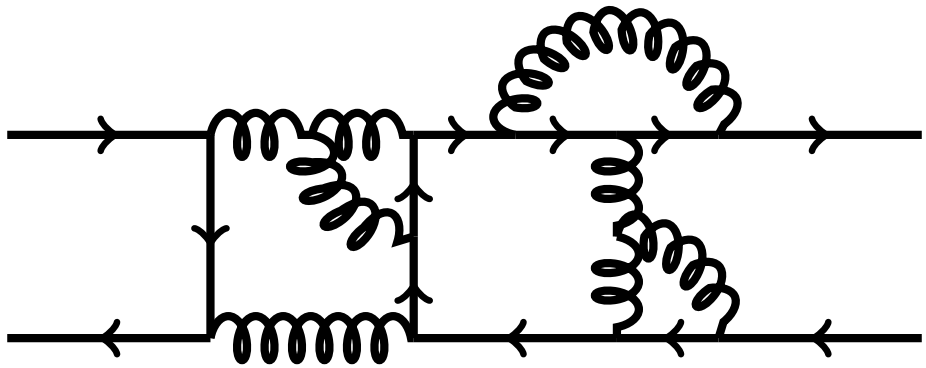
Using `tikzfeynman.sty`, you can draw Feynman diagrams with ease. The default color follows the normal text, so it automatically changes color when you swap from a light to a dark background.



This makes it easy to copy and paste TikZ code from your paper! You can also import diagrams as images. Be sure to use an empty background and pdf/png format to ensure transparency.

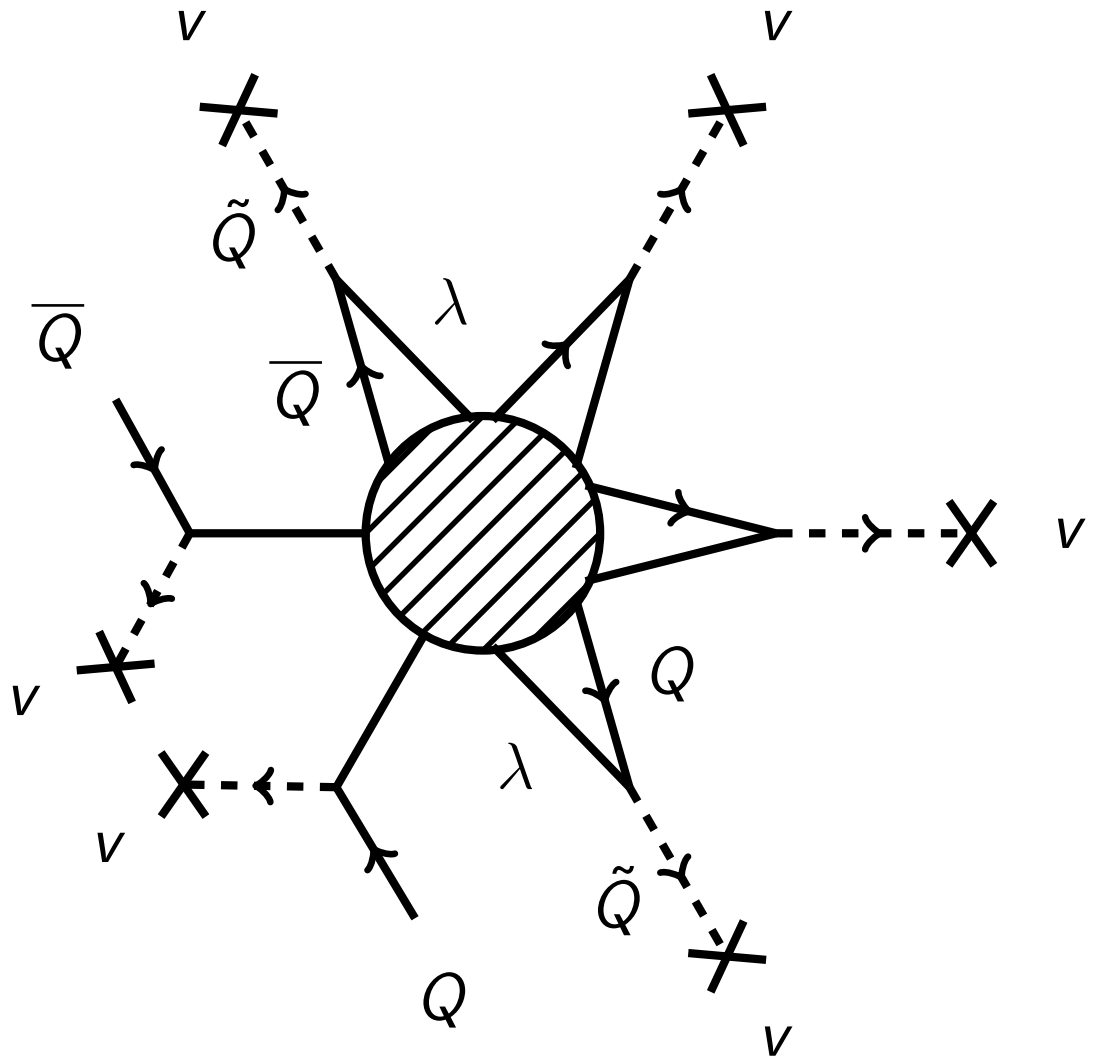
More Feynman Diagrams

Note that TikZ code is preferred because it will automatically change colors and its easy to modify.

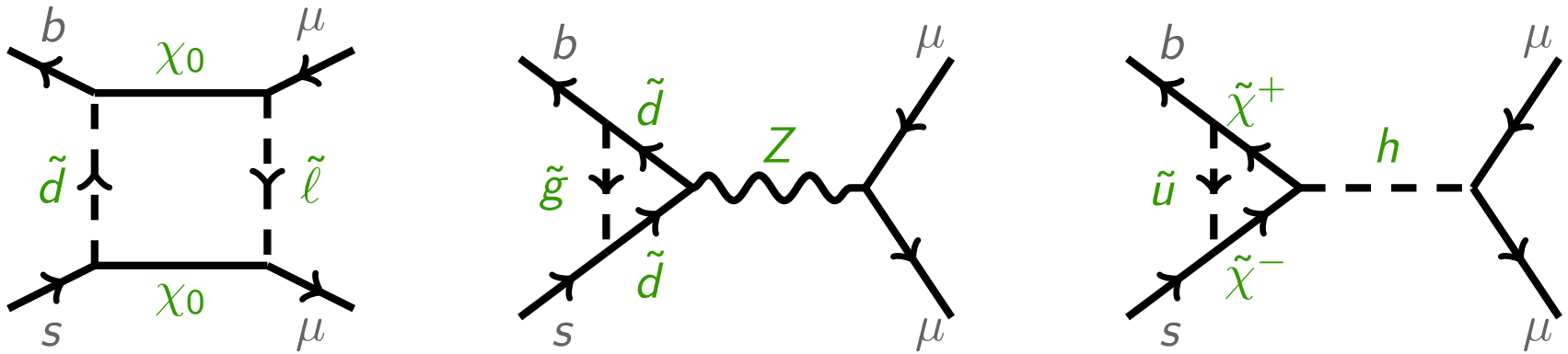


More Feynman diagrams

't Hooft operator



Even more diagrams



TikZ and Beamer are both built on PGF, so they play together very nicely.

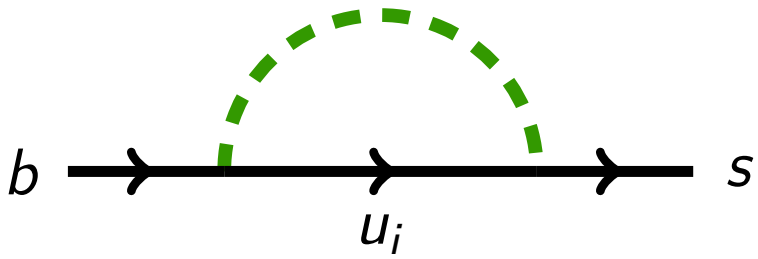
Feynman diagrams and overlays

Penguin diagram

Allows FCNC sub-diagram to occur on-shell.

Here's an example where a sequence of overlays can be used to illustrate some useful physics.

Feynman diagrams and overlays



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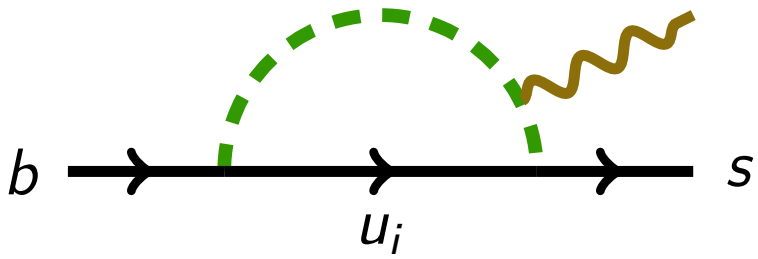

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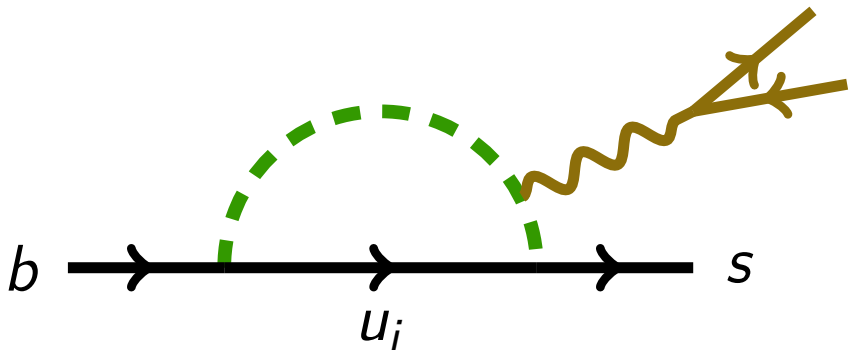

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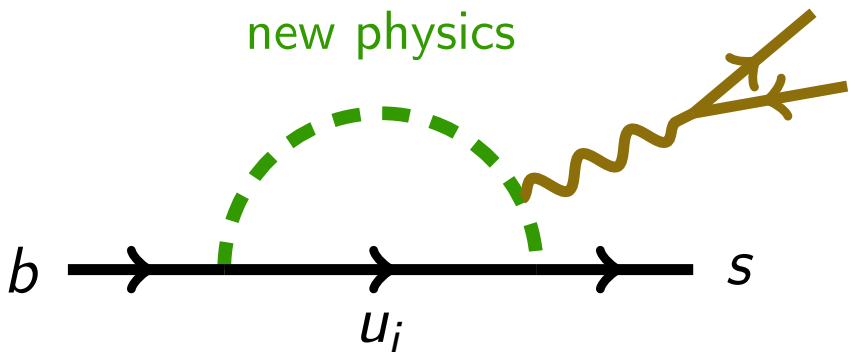

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Other diagrams

Here's a nice picture illustrating Seiberg duality:

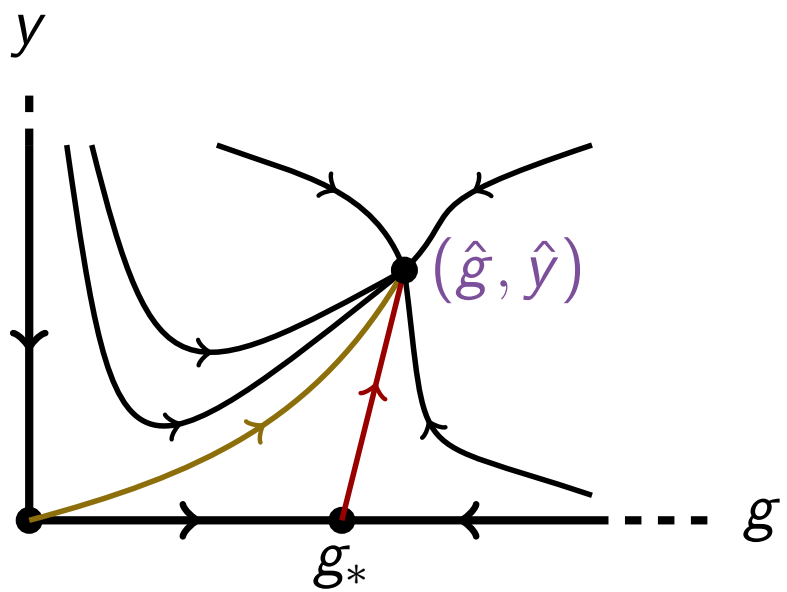


Image based on Strassler's 'unorthodox' review of SUSY gauge theory.

Including a table

Here's how you include a table.

Channel	**Expt.**	**Bound (90% CL)**	**SM Prediction**
$B_s^0 \to \mu^+\mu^-$	CDF II	$< 4.7 \times 10^{-8}$	$(4.8 \pm 1.3) \times 10^{-9}$
$B_d^0 \to \mu^+\mu^-$	CDF II	$< 1.5 \times 10^{-8}$	$(1.4 \pm 0.4) \times 10^{-10}$
$B_s^0 \to \mu^+ e^-$	CDF II	$< 2.0 \times 10^{-7}$	≈ 0
$B_d^0 \to \mu^+ e^-$	CDF II	$< 6.4 \times 10^{-8}$	≈ 0

Some equations

As if you didn't think Beamer could typeset equations...

$$\left(\frac{\Lambda}{m}\right)^{b} = \left(\frac{\Lambda_L}{m}\right)^{b_L} \quad \Rightarrow \quad \left(\frac{\Lambda_{N,F}}{m}\right)^{3N-F} = \left(\frac{\Lambda_{N,F-1}}{m}\right)^{3N-(F-1)}$$

$$G_k(z,z') = \frac{(R')^2}{R} G_y(x,x') = \frac{(R')^2}{R}\frac{xx'}{y}\frac{T(x,y)T(x',y)}{S(wy,y)}$$

$$f_c = \sqrt{\frac{1-2c}{1-(R/R')^{1-2c}}}$$

Design Notes

Watermarking

- Watermarks need to really be transparent or else the background won't show through, e.g. if your background color is not plain white. Fortunately, PGF respects png transparency so watermark images can be saved as png images. Alternately, if you have a nice vector representation in TikZ, you can use the "opacity" option to make it semi-opaque.
- The second problem with watermarks is that even once you have a transparent image, how do you stick it behind the main text of each slide? This is surprisingly subtle. The solution is to put all watermarks the "sidebar right" region controlled by the outer theme style. Anything placed here will remain behind the main text of the screen.
- At the moment this is not implemented in this theme.

Aesthetic use of arrows and nodes

The WIMP Miracle

Contains factors of $M_{\rm Pl}$, s_0, $\cdots$

$$\Omega_{\rm DM} h^2 \approx 0.1 \left(\frac{x_{\rm f}}{20}\right) \left(\frac{g_*}{80}\right)^{-\frac{1}{2}} \left(\frac{\langle \sigma v \rangle_0}{3 \times 10^{-26}\ {\rm cm}^3/{\rm s}} \right)$$

$$\sim \left\langle \frac{\alpha^2 v}{(100\ {\rm GeV})^2} \right\rangle$$

`http://www.texample.net/tikz/examples/beamer-arrows/`

Node decorations, arrows

The new scalar interactions take the form

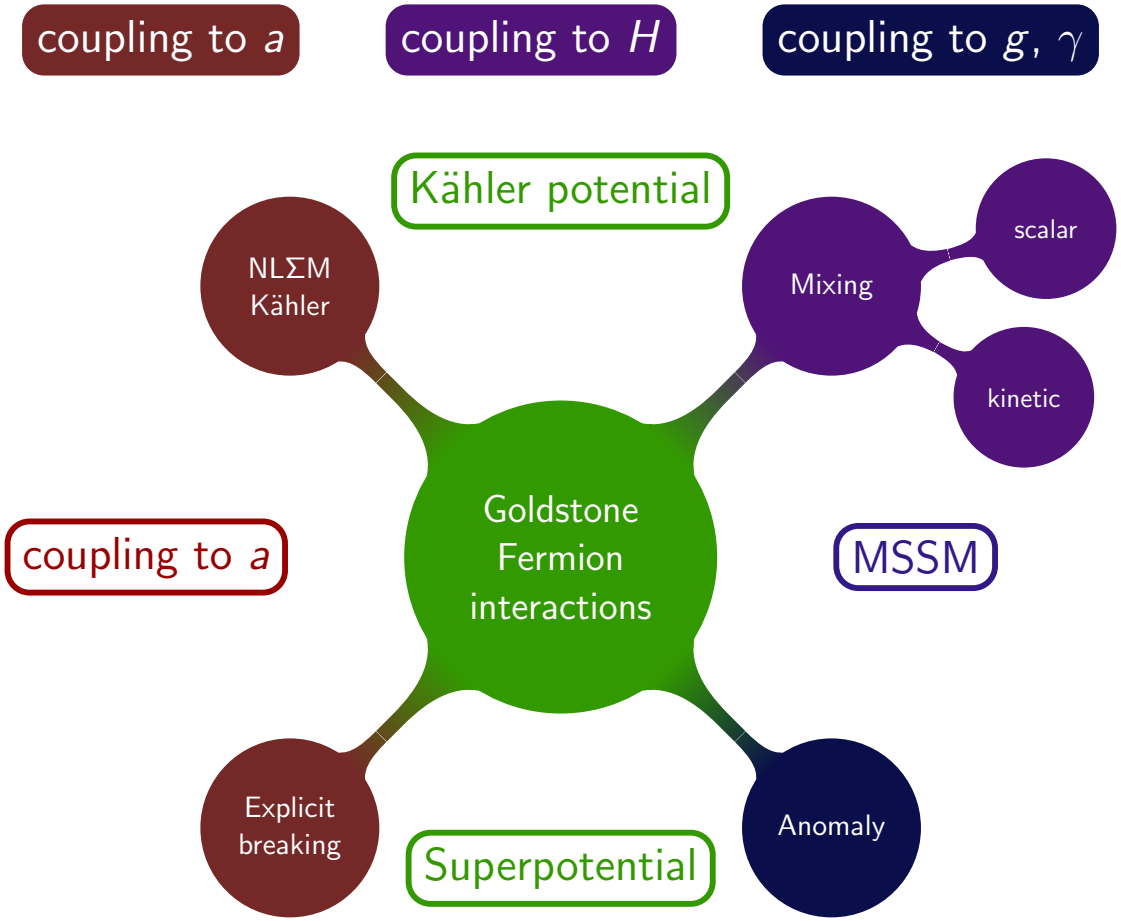
$$\mathcal{L} \supset \left[\frac{1}{2}(\partial a)^2 + \frac{1}{2}\bar{\chi}\not{\partial}\chi\right]\left(1 + c_h\frac{v}{f}h + \cdots\right)$$

c_h depends on c_i and the Higgs mixing angles.

c_h controls direct detection

Mind Maps

```
usetikzlibrary{mindmap}
```

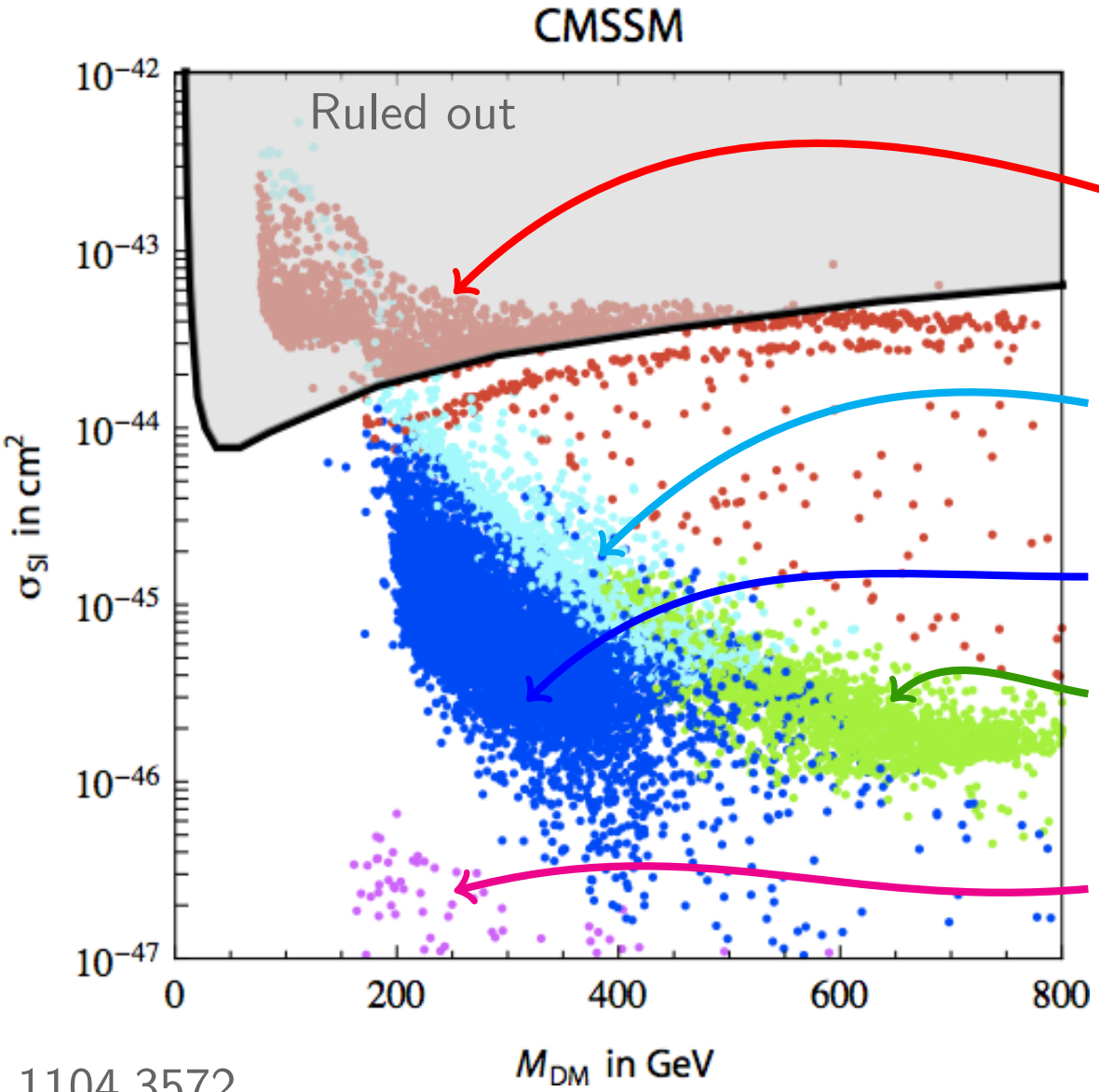


Fonts

Some comments on fonts.

- I use *XeLaTeX* and `fontspec` to specify local fonts. I try to only use readily available fonts on OS X and Adobe, but occasionally I will use a silly font like.
- To mitigate incompatibility with users without these fonts, I include them as user-specified commands in the main file:

Drawing arrows onto a plot



1104.3572

Well tempered neutralino

h^0 resonance

slepton co-annihilations

A^0 resonance

stop co-annihilations

Miscellaneous

- Use \only<2> to only show something for one overlay
- Can also use <2->
- For example, can highlight a word
- If you use \uncover<3-> you get a ... see?
- Protip: use \textbackslash to get a backslash

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Problems and Kludges

Things to work on

- There seems to be a bug in Beamer where the footnote color (defined using `setbeamercolor{footnote}` and `setbeamercolor{footnote mark}`) contaminates the normal text color. For now I suggest not using footnotes.

  They're of questionable use in a talk, anyway.
- Even though comment text is footnote-sized, it still has normal text line spacing. The `setspace` environment can fix this, but it forces a newline and it seems to make footnotes disappear.
- Make color theme more uniform and based on palette colors.

Problems and Kludges

XeLaTeX, LuaLaTeX

XeLaTeX doesn't allow one to use `setbeamertemplate[background canvas]` multiple times (e.g. to have one slide with a different background). A fix is to include `\def \pgfsysdriver{pgfsys-dvipdfmx.def}` before the `documentclass`, but this ends up breaking the arrows pointing to nodes.

In principle, LuaLaTeX can solve this, but that also requires some work since it only looks at Open Type Fonts (e.g. Gill Sans is not available by default).

http://tex.stackexchange.com/questions/29497/xelatex-preventing-beamer-from-using-different-backgrounds

Acknowledgements

I have borrowed heavily (and learned much) from Marco Barisione's Torino theme, which can be found one his blog. I have also learned and borrowed from Shawn Lankton's Keynote theme.

These can be found at

- `http://blog.barisione.org`
- `http://www.shawnlankton.com/2008/02/beamer-and-latex-with-keynote-theme/`

I've tried to maintain lots of comments in the `.tex` and `.sty` files to help other template-designers. At the moment it's all a jumbled mess, though!

Extra page: Additional hints

Look, it doesn't add to the total page count!

- Be sure to turn off any auto-notifiers (e.g. GMail)
- Consider using a PDF-to-keynote program; `http://www.cs.hmc.edu/~oneill/freesoftware/pdftokeynote.html`.
- Don't ever go over time.
- TikZ transparency trick: `http://www.texample.net/tikz/examples/transparent-png-overlay/`
- Use `addtocounter{framenumber}{-1}` for extra slides (like this one) to prevent it from screwing up the page numbering.