

PowerPoint® Tips for Science Talks



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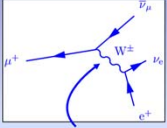


In this session, we'll look at some ways to enhance the communications value of your slides and some tips to avoid humiliation.

The standard software for most scientific talks is MS PowerPoint. Like it or hate it, that's what nearly all AV systems at conferences are set up to use. If you are determined to be an iconoclast and use some other presentation software, fine, but be prepared for last-minute technical difficulties that will annoy your colleagues and cut into your presentation time. If you demand to use something other than PPT, take a PDF version of your talk that you can use when the computer at the seminar room can't run *InDesign* or Adobe *Illustrator*.

Replace the content-less PPT “title” with a meaningful motivating statement

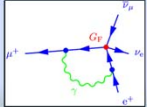
Background



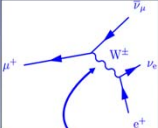
The muon decays only via the weak interaction

All relevant weak interaction physics confined to one parameter with a simple experimental interpretation.

The V-A theory factorizes into a pure **weak** contribution, and **non-weak** corrections, essentially uncontaminated by hadronic uncertainties.

$$\frac{1}{\tau_{\mu^+}} = \frac{G_F^2 m_\mu^5}{192\pi^3} (1 + q)$$


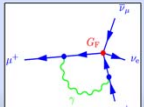
Muon decay gives us unique access to the electroweak scale



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Courtesy David Hertzog

Tip: Write the statement as a sentence and left-justify it

The default for PowerPoint slide “titles” is centered. Change it to left-justified.

You can use the “Master Slide” to format text on all slides. To get to the master slide in PPT 2003, click Shift+the slide icon in the lower left corner of the workspace, or use the “View” menu. To get out of “master slide” view, click CTRL+the slide icon.

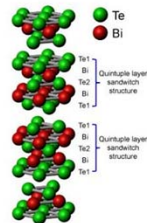
To get to the master slide in PPT 2010, click Shift+the slide icon in the lower right corner of the workspace, or use the “View” ribbon. To get out of “master slide” view, click CTRL+the slide icon.

Every other element that you put on the slide should explain or amplify the statement

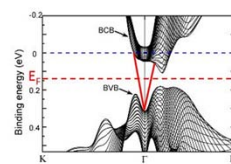
Realization of TI state in Bi_2Te_3

Y. L. Chen, et. al., *Science* 325, 178 (2009)

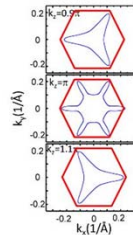
Crystal Structure



Bulk band structure



Bulk Fermi surface (n-type)



Should be larger and not in red

TI Checklist:

1. There exist Dirac surface states
2. There are odd number of Dirac fermions in a Brillouin Zone
3. The E_F is in the gap

Yulin Chen, "Direct Probing the Electronic Structures of Topological Insulators,"
Tutorial on topological insulators, APS March meeting, 2011
http://www.stanford.edu/~chenyl/APS_Tutorial_2011_YulinChen.pdf

People read slides from top down, and they'll look at the statement at the top of the slide first. Make it state one of your key points. People pay the most attention at the beginning of the slide. Keep them engaged and interested by what they look at next. Make it the supporting evidence for your statement.

Use PPT “notes” pages

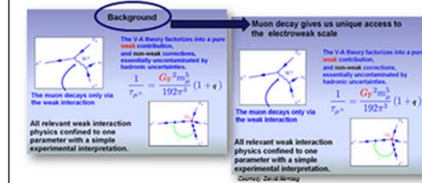
Keeps your
narrative in
sync with your
slides

Prevents you
from turning
around and
reading off the
screen

PowerPoint Tips, Celia M. Elliott

2/20/2013

Replace the content-less PPT “title” with a
meaningful motivating statement



Tip: Write the statement as a sentence and left-justify it

The default for PowerPoint slide “titles” is centered. Change it to left-justified.

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To get to the master slide in PPT 2010, click Shift+the slide icon in the lower right corner of the workspace, or use the “View” ribbon. To get out of “master slide” view, click CTRL+the slide icon.

Print your notes pages out on paper, three-hole punch them, and put them in a notebook.

Put the notebook on the podium so you can easily turn the pages.

Practice looking down at your notes and up at your audience to maintain eye contact.

Write the notes in big-enough font that you can easily read them.

Mark up your notes—highlight important items, make notes of animations, draw red arrows next to items you don’t want to forget to say.

Having a hard copy of your talk is essential. Projector bulbs burn out. Laptop batteries quit. Be able to present your talk regardless of technical failures.

Visual images should inform, explain, or persuade, not merely decorate

Improving the Cooling of Blades and Vanes in Gas Turbine Engines

- To increase efficiency, gas turbine engines have to run at higher power
- Better cooling schemes can dramatically affect the life of blades and vanes in gas turbines



Anybody going to this talk probably already knows what a jet airplane looks like. All this image does is distract the audience from the information the speaker is trying to convey. Who wants to pay attention to the boring, dense text when they can try to figure out what kind of fighter jet this is and how the photographer captured this scary, nose-on photo?

Visual images should inform, explain, or persuade, not merely decorate

Improving the Cooling of Blades and Vanes in Gas Turbine Engines

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- Better cooling schemes can dramatically affect the life of blades and vanes in gas turbines



While a spectacular and captivating photo (of a vapor cloud forming around an F-18 Super Hornet as it approaches the sound barrier), this image has **nothing** to do with cooling schemes for gas turbine engines. Instead of explaining or amplifying the talk, the photo competes with it.

Visual images should inform, explain, or persuade, not merely decorate

Improving the Cooling of Blades and Vanes in Gas Turbine Engines

- To increase efficiency, gas turbine engines have to run at higher power
- Better cooling schemes can dramatically affect the life of blades and vanes in gas turbines



Again, this photo, while an impressive display of engineering chops, does not explain the concepts being presented and does nothing to inform or persuade the audience.

Turn off the “bullet list” feature unless you are really presenting a “list”

Status of Projects

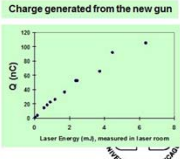
HEP at ANL

Theory

- Connection with UC through Carlos Wagner (now full joint appt) has brought two thesis students to Argonne
- New Assistant level theorist (Tim Tait)
- 7 international workshops organized at Argonne
 - Broad participation by staff and postdocs
- Active work on organizing committees for many workshops held elsewhere
- Physics highlights (Carlos Wagner talk)

Accelerator R&D

- Based on successful demonstration of wakefield acceleration in both collinear and 2-beam configurations, the group has focused on two major developments of the wakefield technique
 - “Practical” demonstration of acceleration to 100 MeV in 1m path
 - This has required a major upgrade of their facility, especially the electron gun and laser system
 - High power tests of externally powered dielectric loaded waveguides in collaboration with Naval Research Laboratory
- 2 new physics processes affecting electron acceleration discovered (and published)

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cum hoc non propter hoc

I recommend turning off the “bullet list” format, which is the default in PPT. Presenting ideas in bulleted lists implies hierarchies or relationships that may not, in fact, exist.

“Lists can communicate only three logical relationships: sequence (first to last in time), priority (least to most important, or vice versa), or simple membership in a set (these items relate to one another in some way, but the nature of that relationship remains unstated). A list can show only one of those relationships at a time.” Gordon Shaw, Robert Brown, Philip Bromiley, “Strategic Stories: How 3M is Rewriting Business Planning,” Harvard Business Review 76, 42–44 (1998).

cum hoc non propter hoc = “with this, not because of this,” i.e., correlation is **not** causation

Use manual line breaks so that the text is not interrupted in awkward places

- SPring-8: electron storage ring for synchrotron radiation, 8 GeV
- LEPS = Laser Electron Photon beam @ SPring-8
- Compton back scatter 351 nm Ar (UV) laser photons off electrons
- produces 1.5-2.4 GeV photon beam



Avoid big empty spaces, too

To make a line break without starting a new bulleted item, press Shift+space bar.

Use the “Order” command on the “Draw” toolbar in PPT 2003 to arrange text and figures in layers. In PPT 2010, right click on the item you want to arrange and then click on the arrow to the left of the “Send to Back” or “Bring to Front” options to arrange layers.

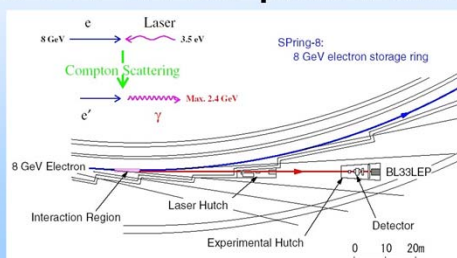
Extra text boxes don't cost *anything*. You can use more than one on a slide.

Use multiple text boxes to maximize your slide “real estate”

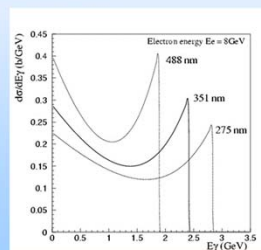
SPring-8: 8-GeV electron storage ring for synchrotron radiation

Compton back scatters 351-nm Ar (uv) laser photons off electrons

1.5-GeV–2.4-GeV photon beam produced



Schematic view of the LEPS beamline and the Compton back-scattering process



Differential cross sections for the BCS process between 8-GeV electrons and laser photons

Here's how I would improve the previous slide.

Turn off the bullets.

If you **have** to show the obligatory aerial photo of the accelerator, make it smaller, move it off center-stage, and crop to emphasize the ring, not the surrounding countryside. A scale would be really nice, but although I found 48 different aerial photographs of SPring-8 on the Internet, not one showed how big it is. A label superimposed on the photo that shows where LEPS is located on the ring would be a good addition, too.

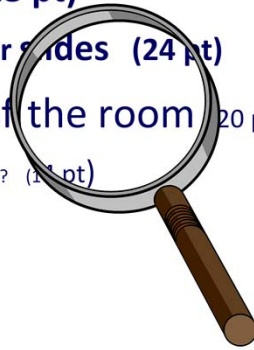
By cropping the aerial photo, increasing the width of the original text box, and adding an additional text box for “1.5-GeV–2.4-GeV photon beam” to run the text underneath the photo, I freed up enough space to add a drawing of the beamline, which includes a cartoon that shows how the photons are produced, and a plot of the energy spectra of the photons.

Some technical-editing changes:

- A hyphen is needed between 8 and GeV in the first line, 351 and nm in the third line, and 1.5 and GeV and 2.4 and GeV in the fifth line of text. In every case, the number is combined with the unit to make an adjective that describes the size of the following noun; you indicate that it's an adjective by hyphenating the two components.
- The abbreviation for “ultraviolet” (and infrared) is always written lower case.
- Provide both lower and upper units for numbers in a range.
- Indicate a range by an en dash, not a hyphen.

Images taken from <http://www.rcnp.osaka-u.ac.jp/Divisions/np1-b/lepsbl.html>.

Choose an easy-to-read font (36 pt)
Make sure your audience (32 pt)
Can easily read (28 pt)
Every one of your slides (24 pt)
From the back of the room (20 pt)
See what I mean? (18 pt)



Tip 1: Turn off “AutoCorrect” to control font size
Tip 2: The bigger the room—the bigger the font

Turn off the automatic “fitting” functions in PPT to avoid having PPT reduce your font size if you exceed the number of characters MS thinks you should have on a line.

In PPT 2003, on the “Tools” menu, click on the “AutoCorrect Options” tab, then select “Autoformat as you type” tab, and uncheck the two “AutoFit” options in the “Apply as you type” list.

In PPT 2010, right click inside the text box, then select “Format Shape” from the drop-down menu. In the dialogue box, click on “Text Box” on the left navbar, and then turn on the “Do not Autofit” radio button in the “Autofit” section.

Choose colors carefully

**LCD projectors change color appearance; and
pastel colors “disappear” when projected**

**Use a neutral background with
a high-contrast font**

**Don’t ever put red on blue or green
(or vice versa)**

Strive for easy reading

Strive for easy reading

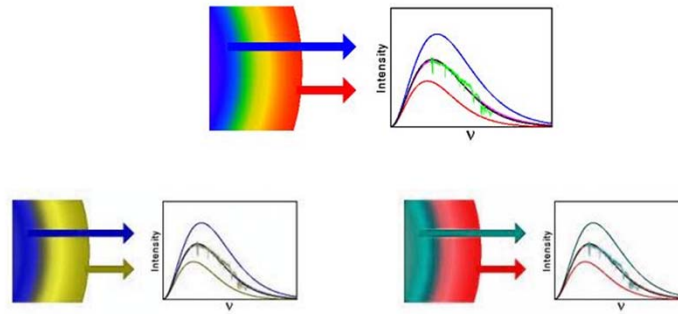
Strive for easy reading

In PPT 2003, to add a background to a slide, click on the “Format” tab on the main toolbar and then click on “Background” from the drop-down menu, then click on the down arrow next to the white box at the bottom of the dialog box.

In PPT 2010, click on the “Design” ribbon, and then select “Background Styles” at the far right of the ribbon.

You can apply different backgrounds to individual slides, but curb your enthusiasm. The background should enhance your message, not distract the audience. And again, people expect change to *mean* something. If you randomly change the background, people will try to assign some meaning when the background changes.

Be sure the audience sees what you see*



*Free color-blindness simulator:

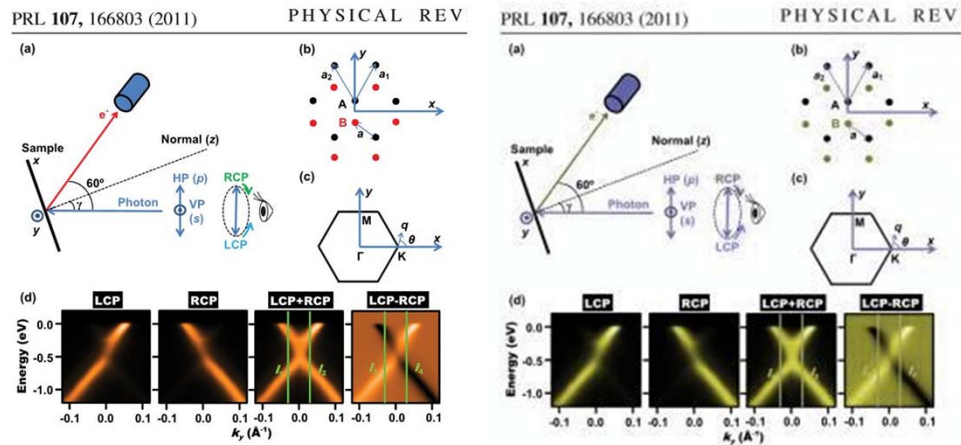
<http://www.colblindor.com/coblis-color-blindness-simulator/>

*Between 10 and 14 percent of white males are red-green colorblind; who's your audience?

If you use color to convey information, make sure that information transfers as you intended it and is accessible to everyone in your audience.

Another good resource is <http://www.colourblindawareness.org/colour-blindness/>.

Be sure the audience sees what you see

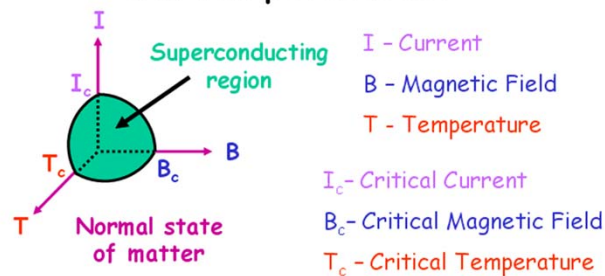


Tip: Don't use red or green to represent important data

Y. Liu, G. Bian, T. Miller, and T.C. Chiang, "Visualizing Electronic Chirality and Berry Phases in Graphene Systems Using Photoemission with Circularly Polarized Light," *Phys. Rev. Lett.* **107**, 166803/1–5 (2011).

Use color consistently throughout the presentation; people expect change to *mean* something

Superconductivity is an electronic state of matter that exists below certain currents, magnetic fields, and temperatures.



This slide uses three primary colors to represent the three key physical parameters: current (purple), magnetic field (blue), and temperature (red). I think this particular image would have been improved by reproducing those colors in the arrows.

Inexplicably, about halfway through the presentation, the speaker switched colors, so that now the B field lines were in red and the temperature lines were in blue. People immediately noticed the change, and *everybody* was confused.

Another problem was that when projected, the deep purple caption was nearly indistinguishable from the both the lighter purple I lines and the red T lines, and I have “normal” vision.

“Embed” special fonts in PPT to avoid embarrassing surprises...

The Strickler-Berg relation opens the door for comparing measured spectral quantities

Strickler-Berg Relation:

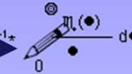
$$1/\tau_0 = 2.880 \times 10^{-9} n^2 \langle \nu_f^{-3} \rangle \int_{\Delta \bar{\nu}_a} \epsilon(\bar{\nu}) d \ln \bar{\nu}$$

Every computer has its own individual “library” of fonts; if PPT cannot find a font when you open your presentation on a different machine, it just arbitrarily substitutes a font that it thinks is “close.” Often, it isn’t...

**Different
computer—
Voila!
“pencils”**

The Strickler-Berg relation opens the door for comparing measured spectral quantities

Strickler-Berg Relation

$$\frac{1}{\tau} = (2.88 \times 10^{12}) \times (n^2 + 1) \times \left(\frac{f}{\nu} \right)^4$$


- (1). Open the document in PowerPoint**
- (2). Click on the “File” tab on the ribbon**
- (3). Click on the “Options” link on the left menu**
- (4). Click on the “Save” link**
- (5). Locate “Embed fonts in the file” option at the bottom of the dialogue box**
- (6). Click in the check box to turn on the option**

Tip: You have to “embed” every time for every talk

The default on PPT is to NOT embed fonts. You have to tell it to embed the fonts on each separate presentation.

You’re given two “embed” options—to embed just the characters in use in the presentation (to reduce file size), or to embed the whole font library. If you’re sending the presentation to somebody else for editing, embed the library. If you’re sure you’re finished editing, embed only the fonts used; it will result in a smaller file.

The instructions on the slide are for PPT 2010. For earlier versions of PPT, do the following:

- (1). Open the document in PowerPoint
- (2). Click on the "Tools" tab on the top menu
- (3). Click on the "Options" link
- (4). Click on the "Save" tab
- (5). Locate “Font options for current document only” and “Embed TrueType fonts”
- (6). Click in the check box to turn on the option

**Before you leave for the conference,
email an editable copy of your talk to
yourself, at an address you can get to**

Laptops fail

Thumb drives get lost

Files get corrupted

**The person who was
supposed to load your talk on the seminar
room's computer gets sick or forgets**



Nothing induces more blind, gut-wrenching panic in a speaker than getting to the appointed place for a talk and realizing that you've got the *next-to-last* version of your talk on your computer or you picked up the wrong thumb drive. Email the final version of your talk to an Internet-accessible address that you can get to from anywhere in the world so that you can download it at the last minute.

To recap:

Everything you put on a slide should enhance, explain, or give evidence for the motivating statement at the top of the slide

Don't put *anything* on a slide that you cannot explain

Don't put more on a slide than the audience can process in < 2 min

Use an easy-to-read (big enough) font

Choose colors carefully

Embed your fonts!

Two PowerPoint classics:

"Death by PowerPoint," Alexei Kapterev

<http://www.slideshare.net/thecroaker/death-by-powerpoint>

"The Gettysburg PowerPoint Presentation," Peter Norvig

<http://norvig.com/Gettysburg/index.htm>