How to
Give Scientific Presentations

Guidelines and suggestions

Lecture Addendum   2011
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Contents:

- Presentation structure

- Scientific contents

- Style of the presentation

- General remarks

- Summary

General Comments

Before you start ...

- Think about what you want the audience to learn from you ?

- Amount of details to be presented
  - depends stronly on the audience
  - need to make compromise between just concepts and technical details.

- Consider overall structure
  - think about inner logical sequence, "Roter Faden", before you write the details

Global Structure of Presentation

1) Title page: Topic, Name, Date, Occasion

2) Outline of presentation

3) Introduction to the physics topic

4) Methods of measurements or theory model

5) Results → Physics message

6) Discussion of the results

7) Summary

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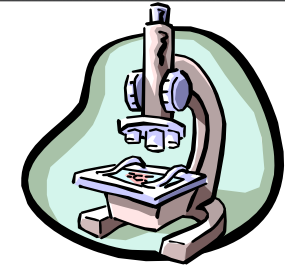- Summary

Scientific Content   (1)

1) **Outline** - table of content

2) **Introduction to the physics topic**
   - What's the motivation for doing (measure or calculate) exactly this ?
   - What is known already; status of other expts, theory;
     (to give justice why this was/is done)

3) **Technical aspects of methods & techniques** :
   - Experiments / measurements:
     - Describe experimental method, principle of ideas...
     - Setup; eg. overview of detector with emphasis on important components
     - special analysis techniques ?
     - What about errors (dominant systematics)?

   - Theory calculations, models; context ...

Scientific Content (2)

4) Results : Concentrate on the essential points

➢ what is the "physics message" ?

➢ what is the significance of measurements ?

➢ don't show 100 numbers or plots -> summarize

➢ some control distributions are ok for understanding

5) Discussion of the results

➢ Comparison of results with other experiments and with theoretical predictions /expectations

➢ What implications does it have? Impact on future ?

6) Summary and Outlook

➢ What's the "take-home message"?

➢ Emphasize the "main physics message"

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Style & Techniques

- Now, this is of course very, very subjective, and I can only give tips and suggestions.

- Many things are common sense, but nevertheless need practice and conscious application.

- Style depends on audience and purpose:
  - Specialised conference or general seminar
  - Is it for students of same class or wider audience?
  - Is talk available to audience in form of paper copies, or electronically on Web (for reference) ?
  - May add technical slides (interleaved or better appended for later references)

Style: Visual Aids … (1)

- Transparencies : Text
    - anything shown should support the message
    - Readable: ie. not too much text, not too many formulae[→]
    - Keywords versus full sentences
    - Color yes, but not too **exhaustive**
        - contrast:

        choosing appropriate   colors is important
    - don't use *too* **many** *fancy* fonts →distracts attention

- Transparencies : Figures and Plots
    - Make plots either large, or don't show them at all
    - give audience time to look at figures and understand them
    - explain well axis and content, point out the message [→]
    - Use graphs and pictures to explain complicated issues

Definitively not like that !

Now, this is very hard to read …
too many formulae, not organised.

$$f(n;\ N,p) = \frac{N!}{n!(n-N)!}\, p^n (1-p)^{N-n}$$

Transparencies should not be like this….

$$f(n_1,\cdots,n_m;\ N,p_1,\cdots,p_m) = \frac{N!}{n_1! n_2! \cdots n_m!}\, p_1^{n_1} p_2^{n_2} \cdots p_m^{n_m}$$

This is not even readable at all…
So it could contain anything – and thus is just plain meaningless

..
readable, ie. not too much text, not too many formulae
plots : either large, or don't show them at all
plots : give audience the time to look at and understand them, Color , but not too **exhaust**ive
don't use *too* **many** fancy fonts (distracts)

$$E[n] = Np$$

$$V[n] = Np(1-p)$$

$$E[n_i] = Np_i$$

$$V[n_i] = Np_i(1-p_i)$$

This is also very subjective...
I personally prefer less crowded stuff ..

$$f(x;\ \theta) = \sum_{i=1}^{m} \theta_i f_i(x)$$

All this is of course very subjective...
Transparencies

readable, ie. not too much text, not too many formulae
plots : either large, or don't show them at all
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$$f(z;\ n) = \frac{1}{2^{n/2}\Gamma(n/2)}\, z^{n/2-1} e^{-z/2} \quad ;\quad n = 1,2,...$$

$$f(n;\ N,p) = \frac{N!}{n!(n-N)!}\, p^n (1-p)^{N-n}$$

$$E[z] = n$$
$$V[z] = 2n$$

$$f(n;\ N,p) = \frac{N!}{n!(n-N)!}\, p^n (1-p)^{N-n}$$

$$E[n] = Np$$

$$f(z;\ n) = \frac{1}{2^{n/2}\Gamma(n/2)}\, z^{n/2-1} e^{-z/2} \quad ;\quad n = 1,2,...$$
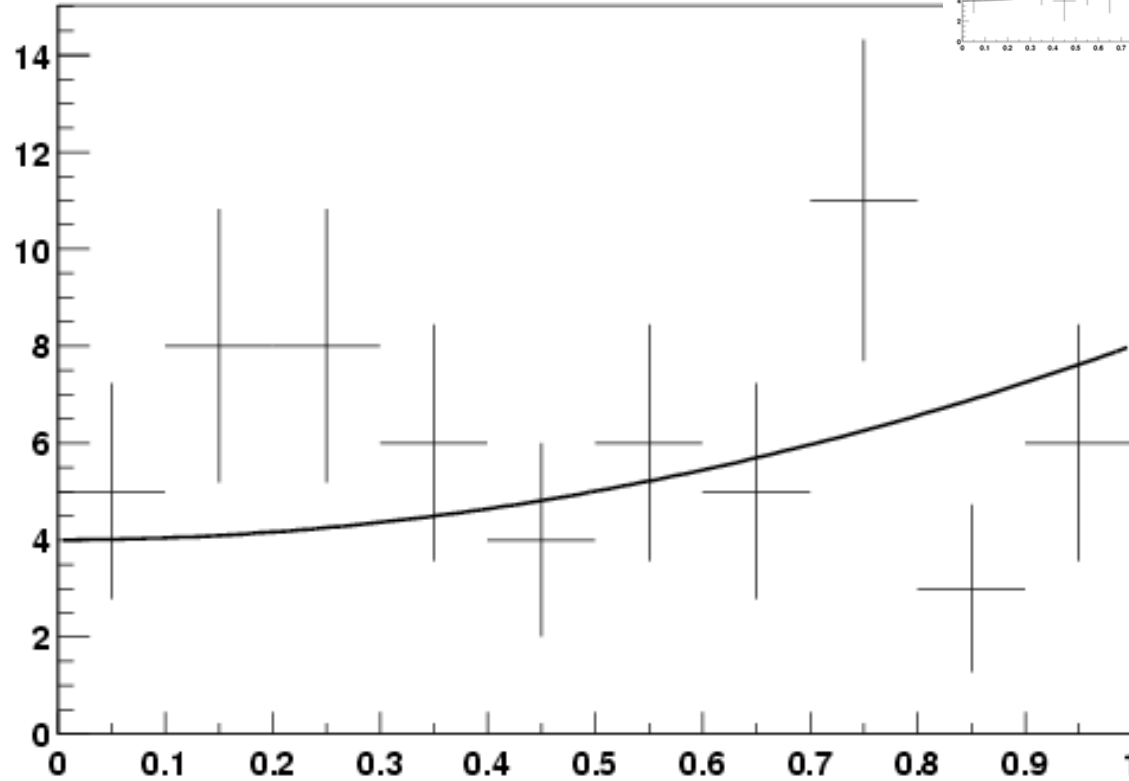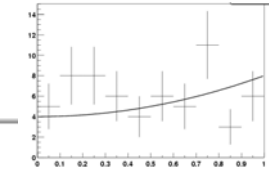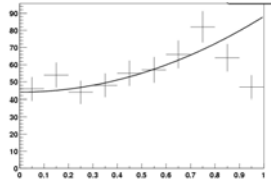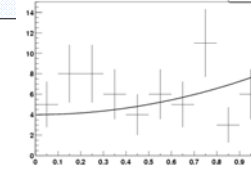
$$V[n] = Np(1-p)$$

$$E[n] = Np$$

$$V[n] = Np(1-p)$$

$$f(x;\ \theta) = \sum_{i=1}^{m} \theta_i f_i(x)$$

$$E[z] = n$$
$$V[z] = 2n$$

What is important, where is the message, please ...?

Nor like this !

What is it?   figures = ?   axis ?   message ?

Higgs decay branching ratios H→ xx

$$H \rightarrow b\bar{b}$$
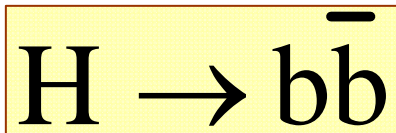
- Decays to b-quark are dominant

- because the **coupling is proportional to the mass.**
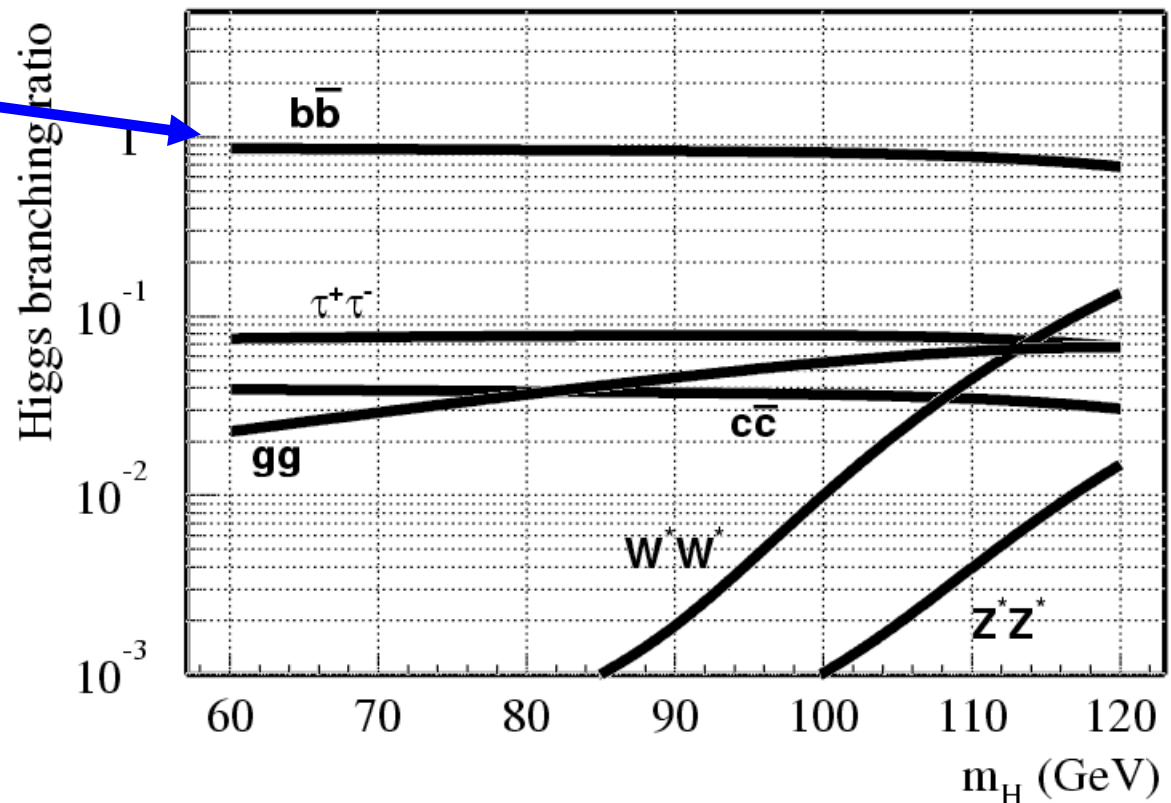
Style: Visual Aids ... (2)

- Electronic (powerpoint) presentations

    - Try out projector, pointer ... before talk !
    - Beware of disturbing pointer movements
    - Ok to use *some* animation procedures,
      eg. appear, overlays, blending .... just don't overdo it !

    - Beware of gimmicks, cheesy cliparts.
    - Do not use too distracting backgrounds
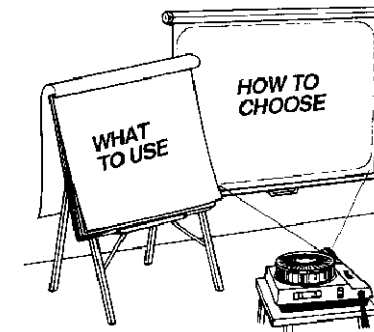
avoid death by powerpoint

Style: Speaking Voice ...

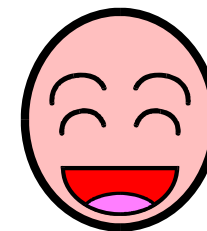❑ Talking in general: **loud, clear, slow**

❑ Tempo: keep a basic speed; but tempo also depends on audience and external constraints (ie. time limits)

❑ Melody: Lively, not too monotonous

❑ Pauses: after important messages, give time to digest

❑ Emphasis: to support message/logic of talk

❑ Comprehension:
  ➢ not too complicated sentences; no dangling sentences;
  ➢ maybe a joke from time to time, but prepare well !
  ➢ don't read out the complete formulae or numbers with all errors etc...

$\alpha = 0.1181 \pm 0.002\text{(stat)} \pm 0.004 \text{ (frag)} \pm 0.006 \text{ (theo)} \pm 0.002 \text{ (exp)}$

Style: Body Language ...

- **View:**
  - Keep eye contact with all persons in audience
  - do not talk to floor, ceiling or windows !

- **Posture:**
  - Act as natural as possible
  - not too stiff, but also not too casual (slouchy)

- **Position:**
  - Move around, if technical setup permits
  - stay firm on feet

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Some general remarks ...

- Observe and learn from others:
  - what are the things you remember as "GOOD"
  - what appears to be "annoying"
  - make notes of DOs and DONTs for yourself

- **_Rehearse_** for yourself
  - loud; check timing; at home it's usually slower
  - have a friend reading the talk or listening
  - always try to do a rehearsal with experts !

- *Practice, practice, practice...*
 - Use opportunities for giving presentation

What about Questions ?

- During presentation:
  - When you ask questions, give audience time to think

- When you are asked:
  - Try to answer short and concise (don't "wander off ...")
  - Don't get drawn into arguments; acknowledge and defer them
  - Repeat question or paraphrase it, to be sure you and the others understood it properly (important when video- or phone-conferencing is done).

- Add question period at end of presentation (not too long).

Summary for Presentations

- There are no absolute rules, of course
  - Pay attention to how others do it...
  - remember the things NOT do do.
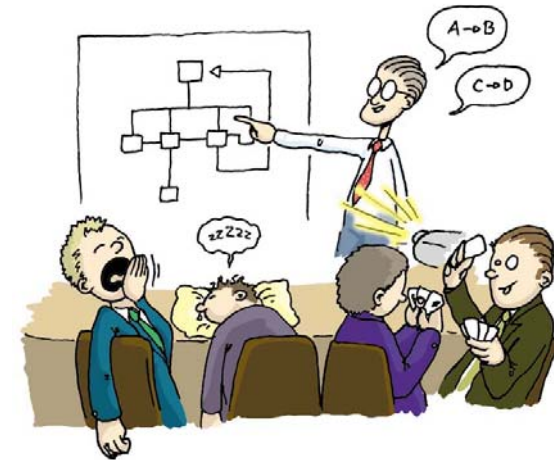
- Try to follow these basic guidelines

- Experience and practice will definitely help !

Thanks to S.Shepard (DiZ) and G.Dissertori for valuable input.

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