Some thoughts on giving Good Scientific Talks

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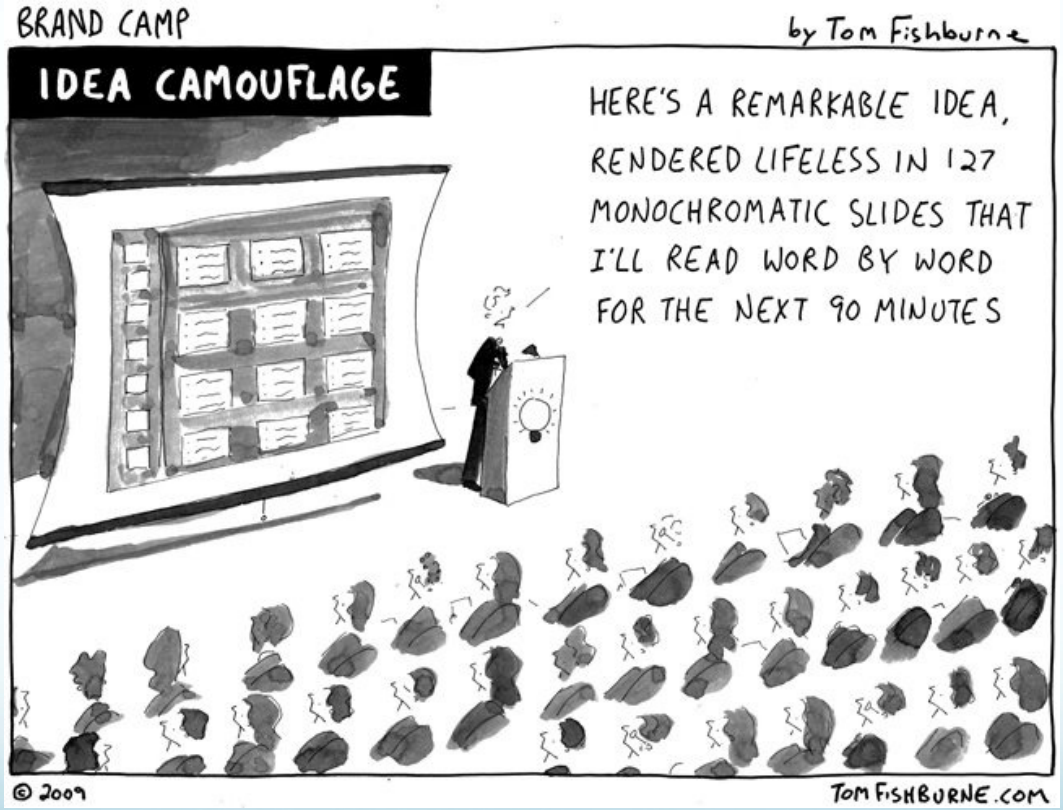
How many talks have you heard that sound something like this?



What makes a good, interesting talk?

Outline

I. Why Bother Speaking Well
II. Some Basic Rules
III. Creating the Talk
IV. Slide Tips
V. Speaking Tips: Do's and Dont's
VI. Handling Questions
VII. Miscellaneous

To give a good talk...

KNOW:

- **your allotted time.**
- **your audience.**
- **your story.**
- **your desired outcome.**
- **your main point and subject matter.**
- **your required practice.**
- **your reception.**

I. Why Bother Working at Speaking Well?

- Conferences, colloquium, and you will have to:
  - This summer
  - Academic talks:
    - Seminars
    - Job Interview Talks
  - Any professional occupation.
  - We aren't talking about teaching. That is a different skill entirely.
- It is important to know how to give a good talk.
  - May never be fun, but these principles can decrease anxiety.
  - There is satisfaction in competence.

Speaking well Matters!

- Get noticed, people remember you.
  - Postdocs, program officers, reviewers, students
- Same goes for business world.
  - Bosses will get *your* ideas
  - Impact on the job; influence others
- Job Talks
  - You will have to give talks when applying for post-doctoral and other jobs
  - As part of the interview to get a job as a professor, after about a decade of graduate school and post-doctoral research, a crucial interview component is a presentation at a colloquium.

With a *little* effort, you can give *great* talks … relatively.

- Many scientific talks are horrible
  - Many scientists put no effort into their presentations.
  - Many violate much of what will be discussed.
  - Many people don't *want* to work at it, even a little.
  - Most people fear public speaking.
- Shy people/introverts mistakenly believe they can't do this well, or is too much work
  - Introverts make great public speakers (with practice).
  - Extroverts do as well (practicing different things).

II. Some Basic Rules

- There are many different kinds of talks you can give.
- Four rules you should ***never*** violate. You should ***never*** give a talk...
  1. that goes overtime under any circumstances.
  2. that is not appropriate for the audience.
  3. that does not have a well-defined story and purpose.
  4. that you haven't practiced.

1. Never go Overtime

KNOW:

- **your allotted time.**

- The “three rules” of public speaking.
- Destroys good will, damages your likability.
- Arrogant and insulting:
  - Are you are more important than audience?
  - Did you not practice? Audience not worth it?
  - Could you not be bothered to look up the talk specifications?
- I have *never* seen a scientific talk too short.

2. Audience Analysis

KNOW:

- **your audience.**

- What is their background?
- What is their interest?
- Why are they there?
- What level should you pitch the talk?
- Is there a mixture of the above? How is that relevant to your talk?
- Not necessarily any decisions yet. But this guides the rest of your decisions.

3. Well Defined Story and Purpose

KNOW:

- **your story**

Giving a good talk means telling a good story. Some ideas:

- For scientific talks start with context
  - What question are you trying to answer? What is the basic science?
- Support the importance of your research
  - Why is this question relevant? What has been done already on this topic?
- Tell what you have contributed
  - How did you do your research? Why choose this method?
  - Summarize what you have learned and its value.

3. Well Defined Story and Purpose

KNOW:

- **your desired outcome**

- What are you trying to accomplish?
  - Communicate recent research results to the scientific community.
  - Communicate science to a lay audience.
  - Advertise research, draw attention to it.
  - Get future papers published, grants funded.
  - Impress people by how smart/competent you are.
  - Get hired.
  - Get through requirement without looking stupid.

3. Well Defined Story and Purpose

KNOW:

- **your main point and subject matter**

- What is the main point of your content?
  - What is the take-away message?
  - New method, new measurement, new calculation.
  - Not the same as what you want to accomplish.
  - Is there more than one main point? That should be clear in your presentation.
  - What material should be presented that is appropriate for the audience and supports the main point?

4. Practice

KNOW:

- **your required practice**

- *Every* talk should be practiced.
- Say it out loud from beginning to the end.
- Decreases fear.
- Polishes the presentation and transitions.
- Debugs slides, logical steps, colors, mechanics.
- Fixes time problems.

III. Creating the talk

Take into consideration what you have already thought about.

- **your allotted time**
- **your audience**
- **your story**
- **your desired outcome**
- **your main point and subject matter**

Don’t put anything in your talk that doesn’t fit with the time, the audience, the story, the desired outcome, and the main point.

III. Creating the talk

- Outline
  - Once you have a story, a desired outcome, and a main point then create an outline
- Main content should be figures and plots.
- How do you start? Engage the audience. Why is this important?
- Cool figures / Good jokes.
  - Sometimes should be used even if the talk is more concise/complete without them
- List Slides
  - About one slide per minute is a good standard
  - Write on paper
  - What is valuable for *this audience* given the *amount of time* allotted?

IV. Slide Tips

- Title: Yes
- Should you have an Outline? Answer: Maybe
  - Can help guide audience.
  - Can calm nerves with easy first slide.
  - Wastes valuable time.
  - Narrative guides audience through talk.
  - Personal preference, but never for talk less than 15 minutes.

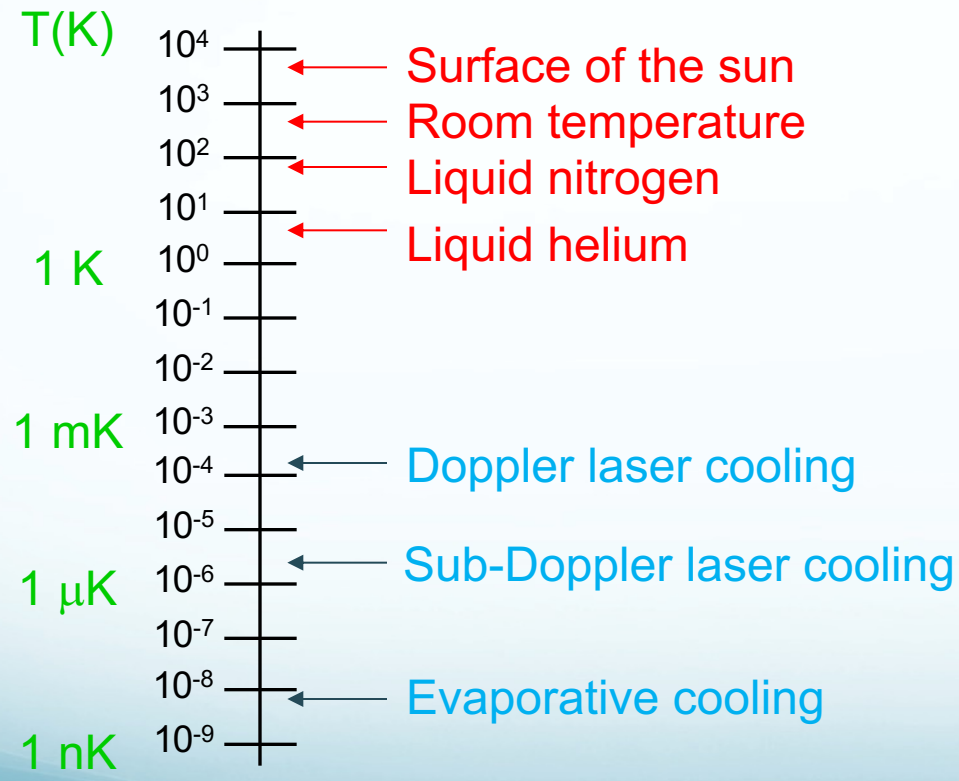
IV. Slide Tips

- Pictures over words!
  - (This talk does, unfortunately, have a lot of “words” but it is not a talk on research, data, results…)
- Bullets over sentences or paragraphs!
- No paragraphs. *Never read paragraphs!*
- Your text should not be exactly what you are going to say. It should be a reminder to you of what you are going to say. It is like an outline, emphasizing to your audience what the main point is, while reminding you of the topic so you can explain further in words. If you put all the words that you are going to say on the slide, it becomes a wall of text. You lose your focus on the audience as you stare at the screen. People will stop paying attention to what you are saying as you drone on and on and on.

IV. Slide Tips

- Don’t be confusing. Avoid clutter. One thought per slide.
- Make text large enough to be seen. Can everything be read from the back of the room?

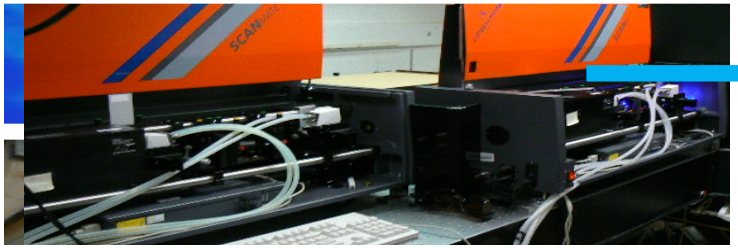
How Low Can You Go?

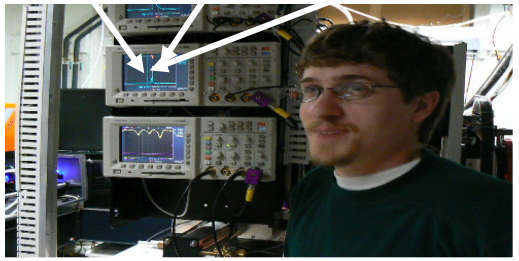


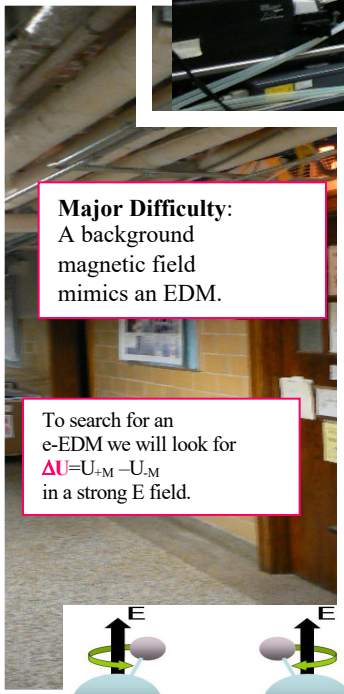
- Everything stays in the gas phase, must be very dilute.
- Temperature is related to the average speed of particles.
- Cooling is the same as slowing down.
- Cannot touch with any physical object.
- Typically 10^3 to 10^9 particles.

$f_1 \approx c/436.8\text{nm} +$
$f_2 \approx c/476.7\text{nm} +$
$f_3 \approx c/532\text{nm}$

$^{206}Pb^{19}F$ $^{207}Pb^{19}F$ $^{208}Pb^{19}F$

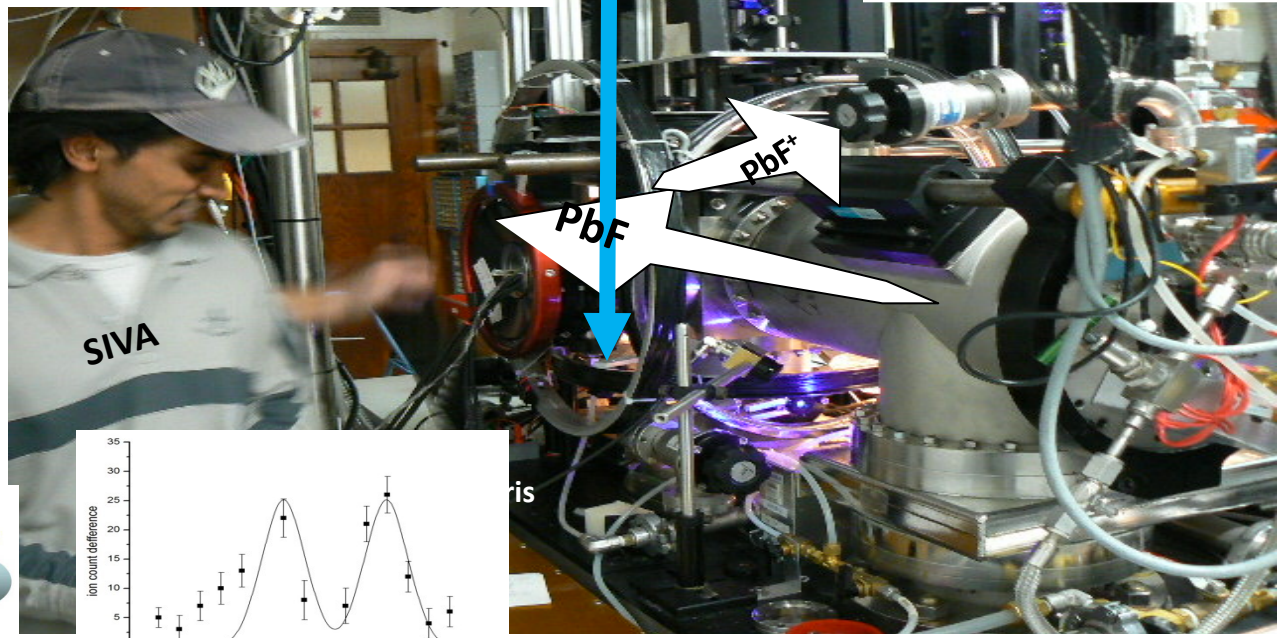


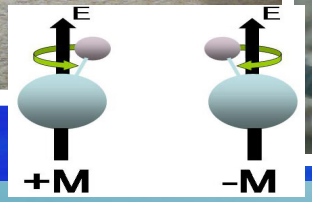




Major Difficulty:
A background magnetic field mimics an EDM.

To search for an e-EDM we will look for
$\Delta U = U_{+M} - U_{-M}$
in a strong E field.





$$U = \mu_B (g\ \vec{B}\cdot\vec{S} + g_{edm}\ \vec{E}\cdot\vec{S}) \qquad \mu_B = 1.39962458\ \text{Hz}/\mu\text{G}$$

V. Slide Tips

- No Acronyms or Jargon.
- The proliferation of BSOs in AGNs is an outstanding problem. Type Ia Sn are not a source of such QSOs. Furthermore, the lack of new TLAs may force us to consider ETLAs
- Acronyms may be used if and only if they are clearly defined in the talk.

V. Slide Tips

- No equations!
- Really?
- Ok, not necessarily. But you must explain every equation.
  - Every term could be explained, or…
  - Important terms could be explained (but then why the whole equation?)
  - Does the equation really add value to the talk? Is it the best way to present the point you are trying to make?
  - Will your audience care?

IV. Slide Tips

- No code, circuit diagrams, machine drawings.
  - Only exception might be in a very technical working meeting.
  - Will your audience care?

Sample Input File

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   flambda   =  .true.
   taumin    =  0.001
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   zeta      = 1.0
   stspec    = 3100.0
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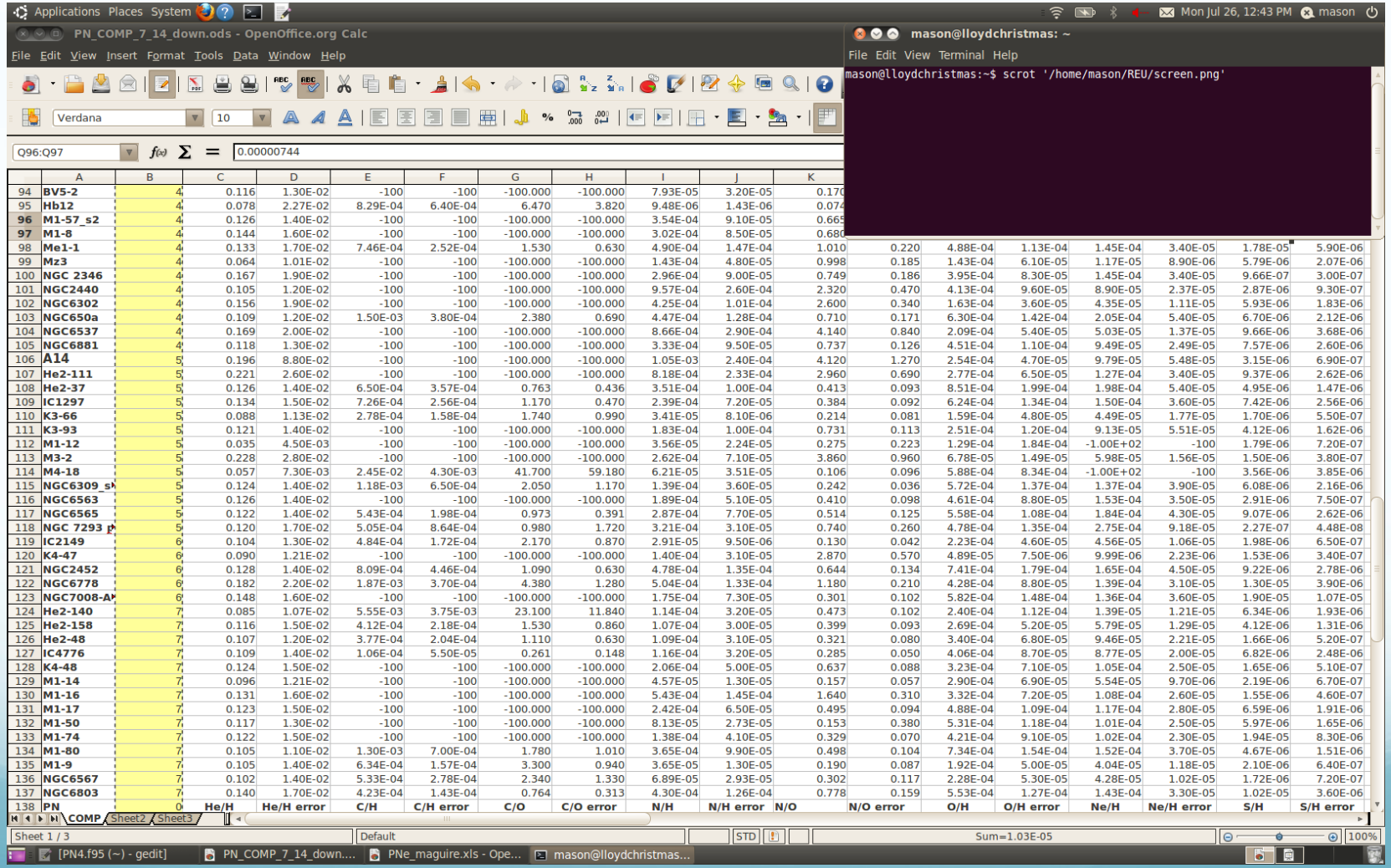

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95	Hb12	4	0.078	2.27E-02	8.29E-04	6.40E-04	6.470	3.820	9.48E-06	1.43E-06	0.074							
96	M1-57_s2	4	0.126	1.40E-02	-100	-100	-100.000	-100.000	3.54E-04	9.10E-05	0.665							
97	M1-8	4	0.144	1.60E-02	-100	-100	-100.000	-100.000	3.02E-04	8.50E-05	0.680							
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116	NGC6563	5	0.126	1.40E-02	-100	-100	-100.000	-100.000	1.89E-04	5.10E-05	0.410	0.098	4.61E-04	8.80E-05	1.53E-04	3.50E-05	2.91E-06	7.50E-07
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118	NGC 7293 p	5	0.120	1.70E-02	5.05E-04	8.64E-04	0.980	1.720	3.21E-04	3.10E-05	0.740	0.260	4.78E-04	1.35E-04	2.75E-04	9.18E-05	2.27E-07	4.48E-08
119	IC2149	6	0.104	1.30E-02	4.84E-04	1.72E-04	2.170	0.870	2.91E-05	9.50E-06	0.130	0.042	2.23E-04	4.60E-05	4.56E-05	1.06E-05	1.98E-06	6.50E-07
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127	IC4776	7	0.109	1.40E-02	1.06E-04	5.50E-05	0.261	0.148	1.16E-04	3.20E-05	0.285	0.050	4.06E-04	8.70E-05	8.77E-05	2.00E-05	6.82E-06	2.48E-06
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132	M1-50	7	0.117	1.30E-02	-100	-100	-100.000	-100.000	8.13E-05	2.73E-05	0.153	0.380	5.31E-04	1.18E-04	1.01E-04	2.50E-05	5.97E-06	1.65E-06
133	M1-74	7	0.122	1.50E-02	-100	-100	-100.000	-100.000	1.38E-04	4.10E-05	0.329	0.070	4.21E-04	9.10E-05	1.02E-04	2.30E-05	1.94E-05	8.30E-06
134	M1-80	7	0.105	1.10E-02	1.30E-03	7.00E-04	1.780	1.010	3.65E-04	9.90E-05	0.498	0.104	7.34E-04	1.54E-04	1.52E-04	3.70E-05	4.67E-06	1.51E-06
135	M1-9	7	0.105	1.40E-02	6.34E-04	1.57E-04	3.300	0.940	3.65E-05	1.30E-05	0.190	0.087	1.92E-04	5.00E-05	4.04E-05	1.18E-05	2.10E-06	6.40E-07
136	NGC6567	7	0.102	1.40E-02	5.33E-04	2.78E-04	2.340	1.330	6.89E-05	2.93E-05	0.302	0.117	2.28E-04	5.30E-05	4.28E-05	1.02E-05	1.72E-06	7.20E-07
137	NGC6803	7	0.140	1.70E-02	4.23E-04	1.43E-04	0.764	0.313	4.30E-04	1.26E-04	0.778	0.159	5.53E-04	1.27E-04	1.43E-04	3.30E-05	1.02E-05	3.60E-06
138	PN	0	He/H	He/H error	C/H	C/H error	C/O	C/O error	N/H	N/H error	N/O	N/O error	O/H	O/H error	Ne/H	Ne/H error	S/H	S/H error

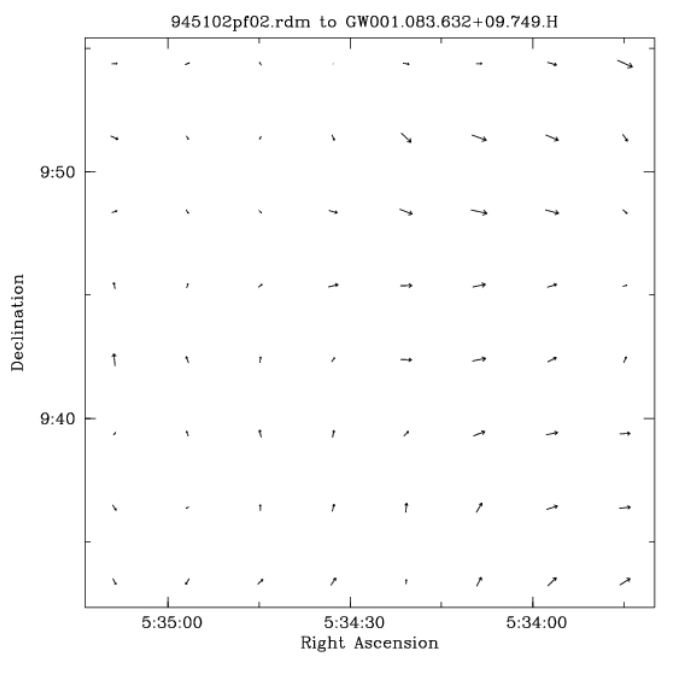
COMP Sheet2 Sheet3

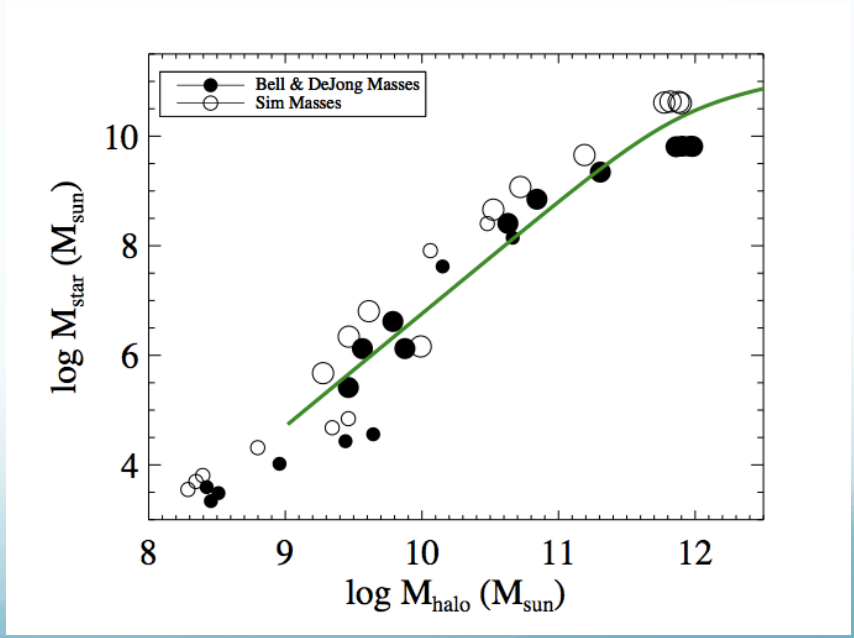
V. Slide Tips

- Graphs: *legible!*
  - No clutter
  - Labels, axes
  - Symbols and lines large enough
  - Is anything too cluttered
  - Can everything be seen from the back of the room?
- Colors: Check colors.
- When planning, assume 30 to 120 seconds per slide.
- I prefer little, or no, text animation for scientific talks

Which is better?

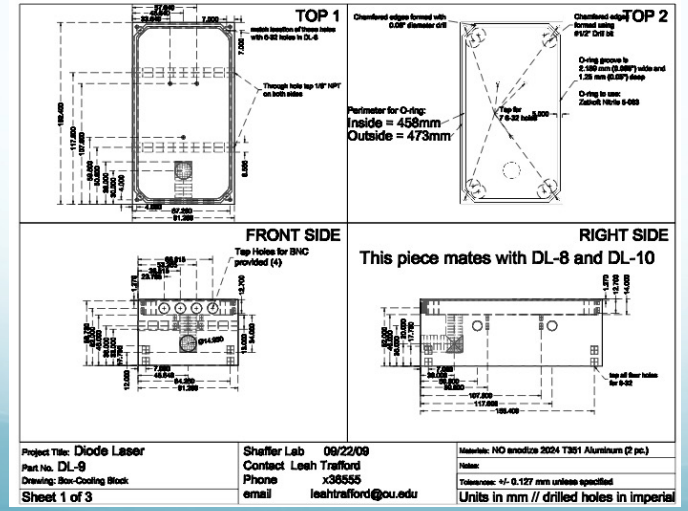
- Can you read axes? What does the plot mean? Is the title understandable? Can you see the data?

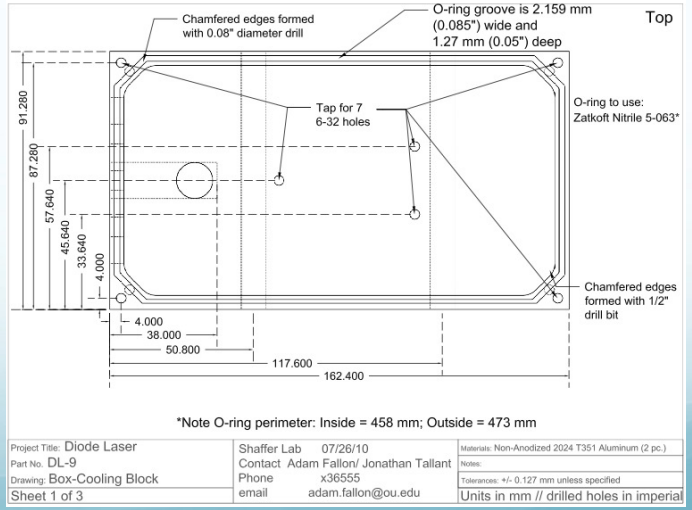




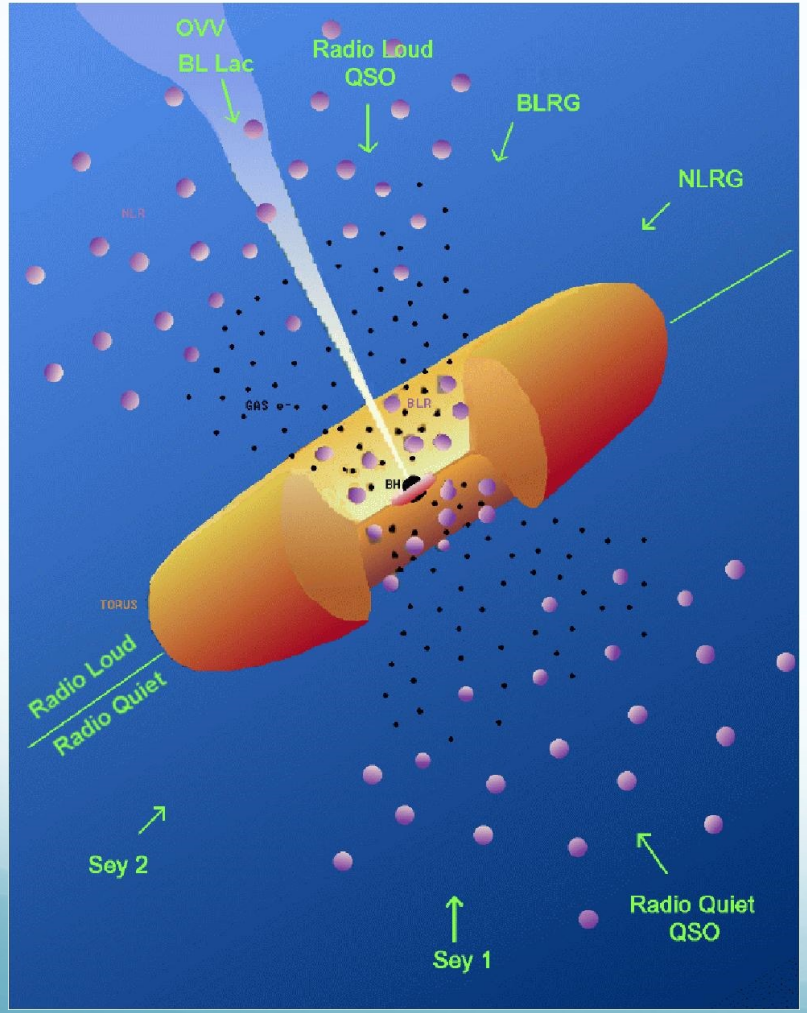
The First of My Obstacles

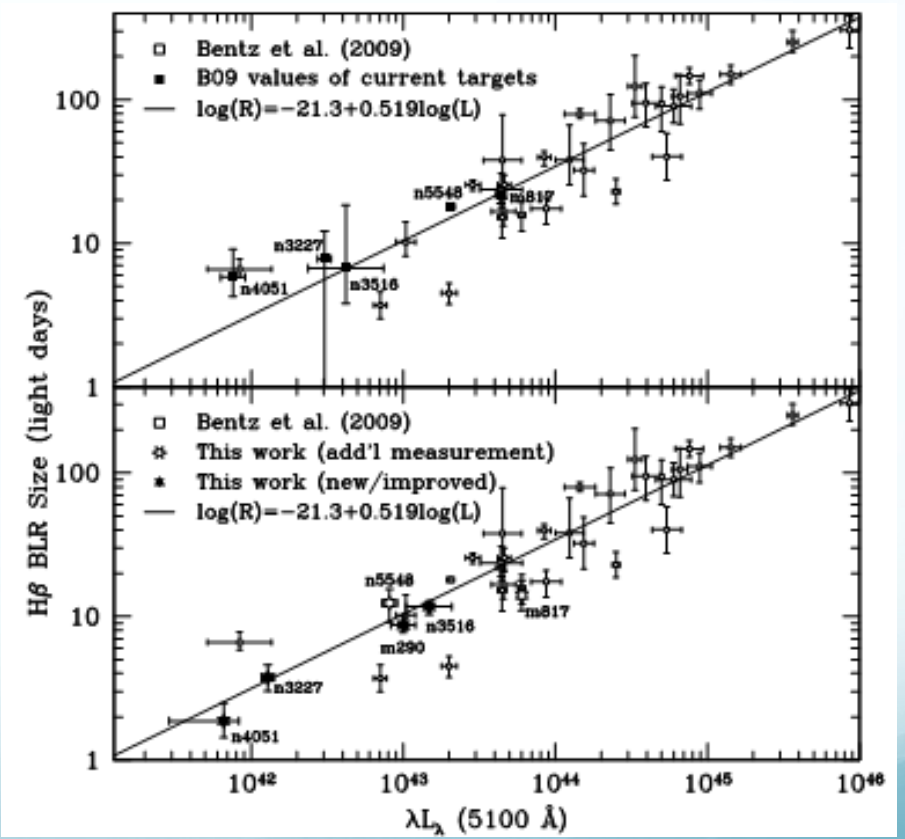
- I did not create every piece in AutoCAD
- I assumed those I did not adjust to be good enough for the machine shop
  - They had built a strikingly similar design before





Radius and Luminosity?





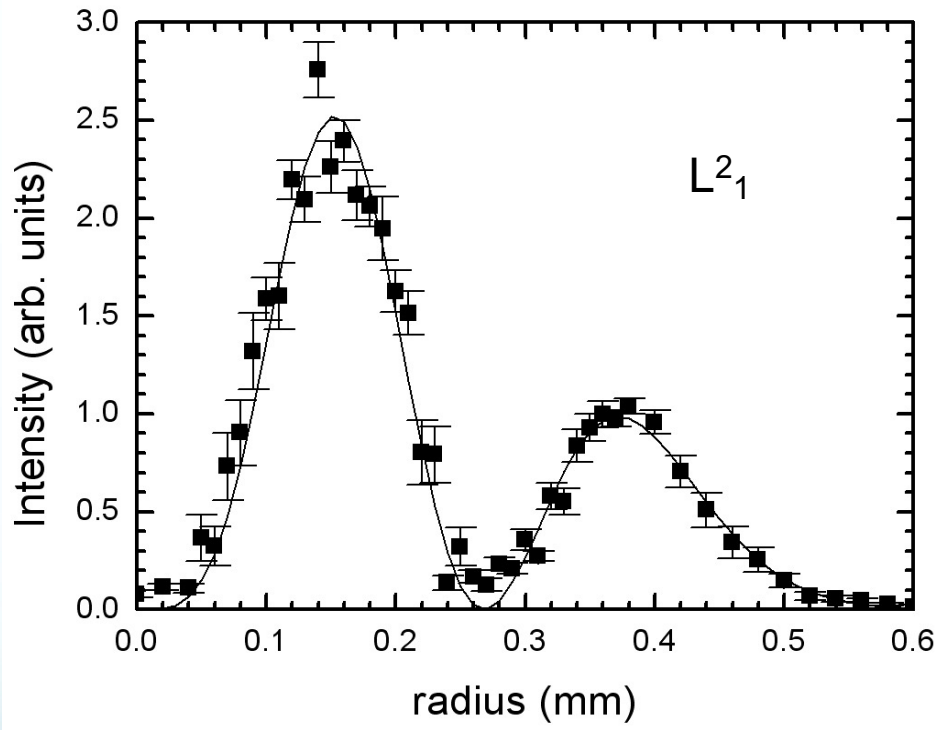
Denney et al

Detailed Beam Analysis

- Measured intensity profile..
- Rigorous fit to superposition of modes to determine mode quality.
- Fits consistent with 100% in mode of choice.

Also measured:

- Propagation characteristics
- Extinction ratios
- Conversion efficiencies
- Misalignment effects



(99.3 +- 0.9)% of intensity in L^2_1 mode.

Sharon A. Kennedy, Matthew J. Szabo, Hilary Teslow, James Z. Porterfield, and E. R. I. Abraham, Physical Review A **66**, 043801 (2002).

$\alpha_s(p_T)$ results

- Use p_{Tnbr} > 50, 70, 90 GeV (138 data points)
- At each p_T, combine all data points with different p_{Tnbr} and ΔR requirements
- Determine results for $\alpha_s(p_T)$ at 12 p_T values

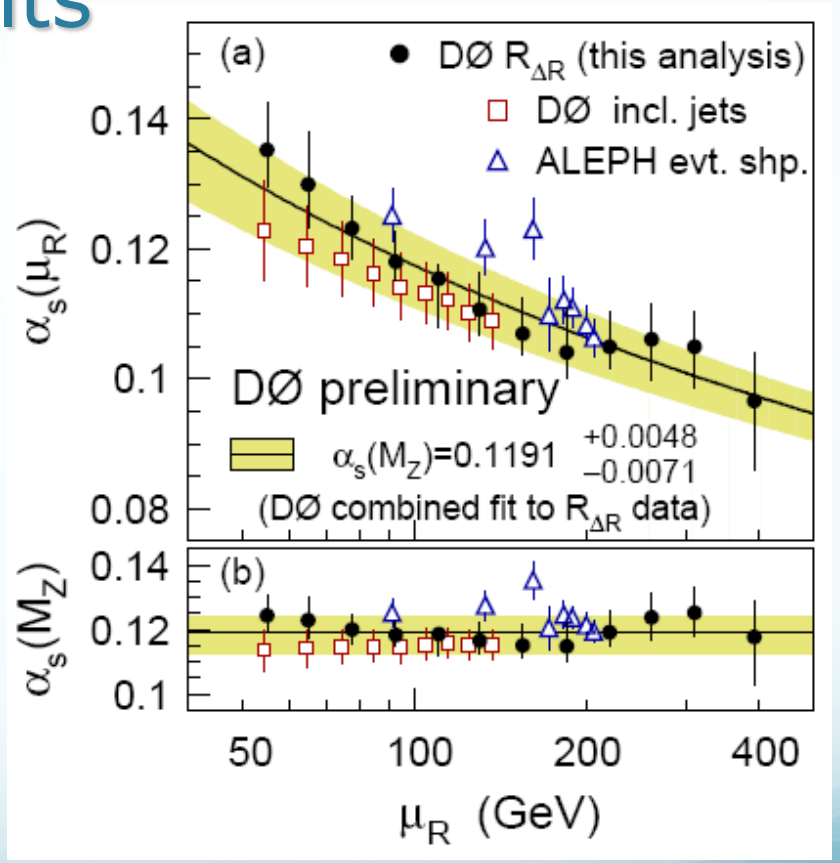
→ $\alpha(p_T)$ results up to 400 GeV

→ $\alpha_s(p_T)$ decreases with p_T as predicted by the RGE

Results agree with results from

→ ALEPH event shape data

→ Previous DØ results from inclusive jets



$$\alpha_s(M_Z) = 0.1191^{+0.0048}_{-0.0071}$$

VI. Speaking Tips: Do's

KNOW:

- **your reception.**

- Do speak to audience, not to the computer or screen.
- Do look at the audience and react to visual cues.
- Do include the people in the back.
- Do have good legible graphics
- Do practice your talk.
- Do start strong.

VI. Speaking Tips: Dont's

- Don't block projector.
- Don't speak in monotone.
- Don't put in too much information.
- Don't put in too many equations.
- Don't have too much information on any slide
- Don't cover up parts of the slide: beware of appearing text.
- Don't go over the top. You are not in debate class, acting, or selling cars.
- Don't go overtime.

Remember

- It is *your* talk. You are probably the expert in the room. It is your research. Be confident.
- You have practiced your talk so you know what you want to say, how you will make transitions, and how long your talk will take.

VI. Questions

- Sometimes questions are the most challenging part of the talk.
- Repeating the question may give you time to think.
- If you don’t know the answer don’t make something up. Don’t panic. “I don’t know but I’ll look that up” is a perfectly reasonable answer.
- If the questioner is belligerent, take it off line.

VII. Miscellaneous

- Dress appropriately.
- Prepare for AV equipment.
- Be yourself. Don’t try to mimic someone else.
- Keep humor at professional level. Careful going overboard with internet pictures.
- Oh, yeah, and remember to practice and don’t go overtime.

Questions?


Well my fellow anthroposophists, I'm sure my lecture has made you think.
I stopped listening after 5 minutes.
What a bore.
ZZZZ....
I need a wee wee.