

## Effective Posters— *Presenting your Results Clearly and Persuasively*



Courtesy Carlos A. Alvarez Zarikian

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1

### **An effective poster must**

**Attract and engage the audience—**

- **prominent title**
- **visually interesting figures (lots)**
- **clean, uncluttered appearance**

**Highlight key points so they are *immediately* recognizable**

**Be arranged logically so a viewer quickly understands the “story”**

**Contain all elements of a good research paper—motivation, methods, results, discussion, conclusions, acknowledgments**

2

## Distill your message

What one idea do you want your audience to remember when they walk away from your poster?



How can you best represent that one idea?

In pictures?

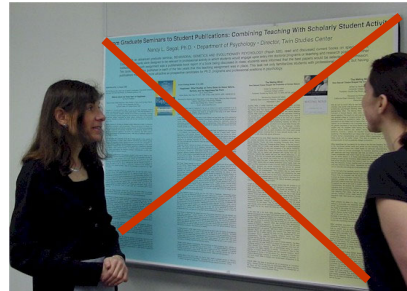
In plots?

In words?

**Tip: Note that “words” is the last item on the list!  
(and should take up the least space on your poster)**

3

## Use the visual elements of the poster to tell the story



4

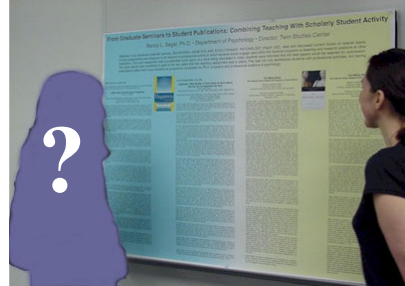
## Use the visual elements of the poster to tell the story

Engage the audience

Emphasize main points

Illustrate apparatus,  
methods, and results

Summarize numerical data to show trends  
or reveal relationships



**Tip: People remember pictures, not words**

5

## At least half your “story” should be told in pictures

No graphic should be smaller than  
5 in × 7 in (13 cm × 15 cm), and most  
should be larger

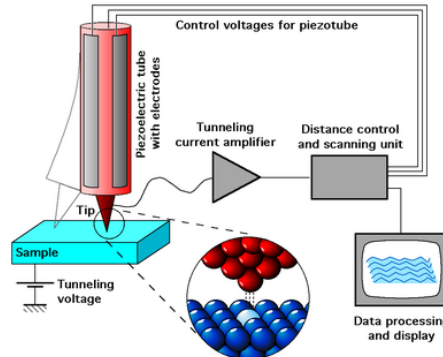
Crop and enlarge photos and simplify  
drawings to focus attention on important  
details

Scan photos at 300 dpi

Provide a brief caption for every graphic;  
tell people what to look for

6

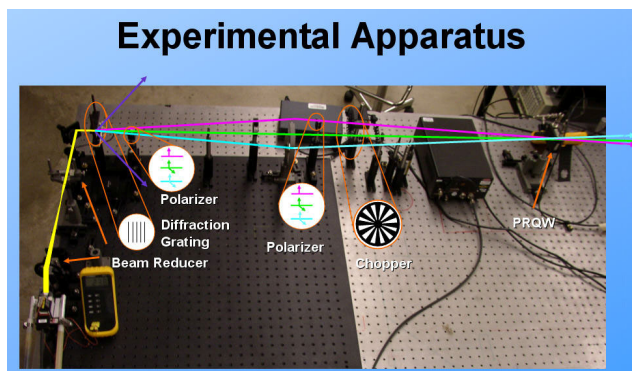
## Don't use pointless graphics



Your project used a scanning tunneling microscope to characterize your thin-film superconducting samples. Which is a better image for your poster?

7

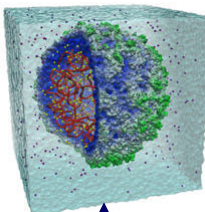
## This excellent graphic shows the apparatus *and* the process



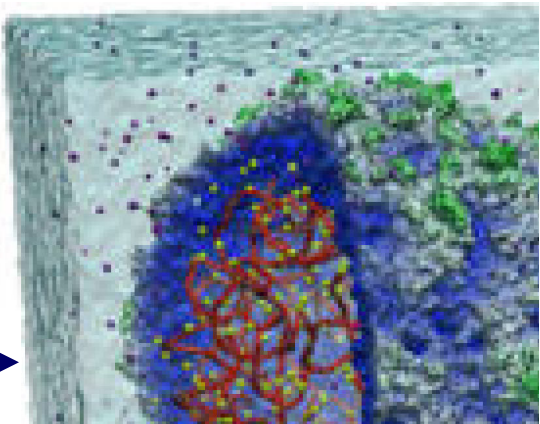
**Tip: Show pictures of equipment only if they are related to an important idea that you want to convey**

8

## Avoid using graphics taken from the Internet; they're too low-res to print acceptably



Theoretical and Computational Biophysics Group  
University of Illinois at Urbana-Champaign




Looks fine on your monitor; looks awful blown up to poster size and printed.

9


## Make every graphic mean something; avoid “eye candy”

### Improving the Cooling of Blades and Vanes in Gas Turbine Engines

**To increase efficiency, gas turbine engines have to run at higher temperatures**

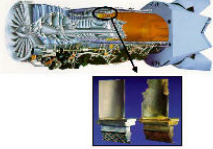


Jet engines

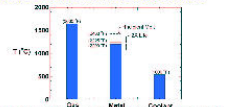


Power turbines

**However, higher combustion temperatures reduce the life of the blades and vanes**

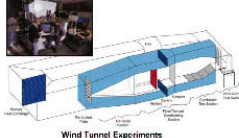


**Better cooling schemes can dramatically affect the life of blades and vanes in gas turbines**




If a cooling scheme can decrease the temperature that a blade experiences by 20°C, the blade's life will double

**Our laboratory studies cooling schemes through experiments and computations**


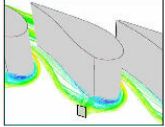


Wind Tunnel Experiments

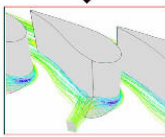


Computational Predictions

**Results from our studies are helping sponsors design better gas turbine engines**

Without Fillet: Unwanted Vortices

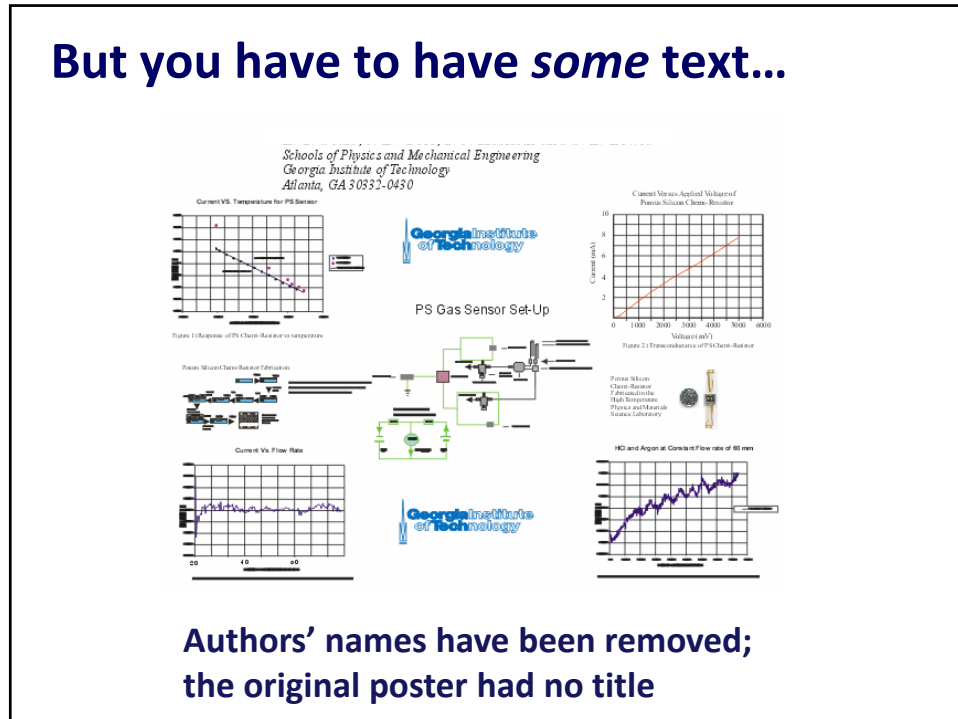


With Fillet: Vortices Reduced

**In summary, we are improving the cooling of blades and vanes in gas turbine engines**

10

## But you have to have some text...



11

## Use easy-to-read fonts

Sans-serif fonts usually print well and are easier  
to read from a distance than serif fonts

**fancy fonts are harder to read**

**DON'T USE ALL CAPS, EVEN IN THE TITLE**  
—much harder to read (and proofread!)

Title—120 pt

Section headings—60 pt

Figure captions—48 pt

Text—36 pt

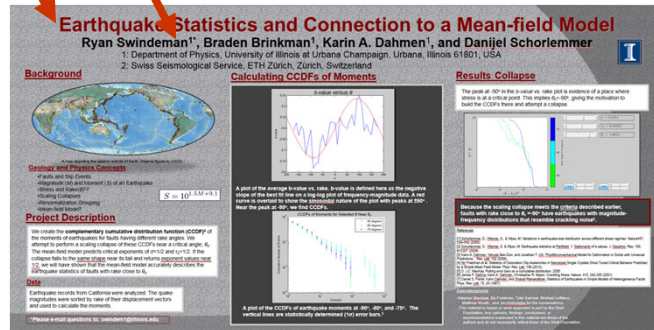
**Tip: Scale the font with the size of the poster**

12

## Every poster must have a “headline” (title) and a “byline” (authors)

Title—<10 words

Your name and affiliation—Ask your adviser  
NOW about co-authors



Tip: If it's important, make it BIG

13

## Present text in lists rather than paragraphs

Figures promote audience interest, provide supporting evidence, help explain complex ideas and relationships quickly, and give the viewer something to remember

Use figures to:

- promote interest
- provide supporting evidence
- explain complex ideas quickly
- show relationships
- give the viewer something to remember

Tip: Lists are easier to process quickly and are easier to remember

14

**Include an “abstract” only if your poster is going to be unattended for lengthy periods\***

**If you’re standing there explaining the work, nobody’s going to read an abstract anyway**

**Use the space for something more compelling and visually interesting**

**If you *must* include an abstract, keep it very brief (<50 words)**

**\*or if your adviser tells you to...**

15

**Remember that people will be looking at your poster while standing, not sitting**



**Tip: Don’t put important points in tiny print at the bottom**

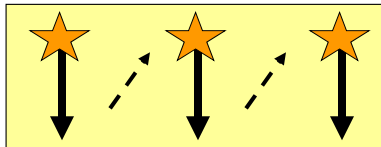
16



**Most viewers will start at the upper left corner of the poster and read down and across**

**Break up your story into columns (think “newspaper”)**

**Put important points at the top of each column**



**Tip: Keep lines of text <20 words long—people’s eyes don’t easily track strings of text longer than that, even at 30 pt**

17

**How is the viewer going to navigate through this poster?**

A scientific poster titled "Prospects for  $\phi$  meson production at ALICE". The poster is densely packed with text, diagrams, and charts. It includes sections on "Resonances, Essentially", "Medium Effects", "Resonance over production", "The  $\phi$  meson", and "ALICE detector". There are several graphs, including a 3D plot of a phase transition and a 2D plot of a resonance. The poster is organized into columns and sections, following the principles discussed in the previous slide.

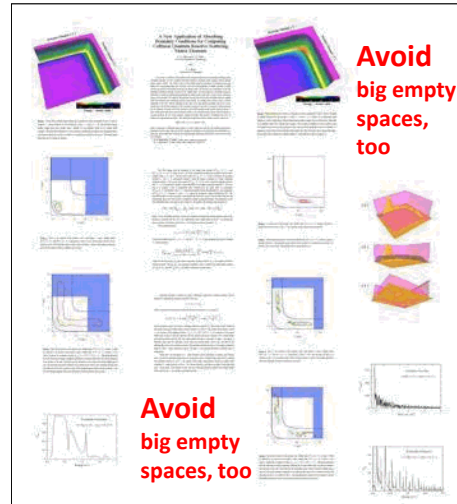
18

## Use headings to guide the viewer through the poster

Make your key points immediately recognizable

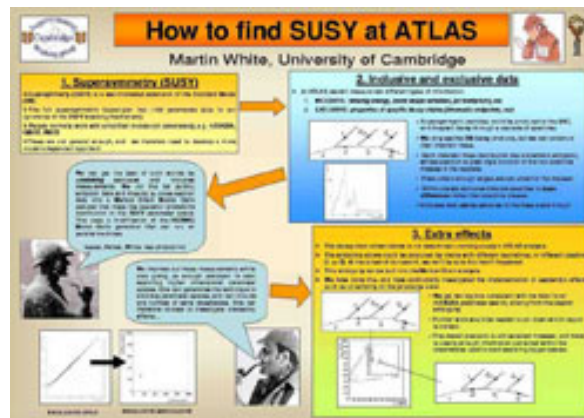
Use headings to help viewers locate what interests them

- Motivation
- Methods
- Results
- Conclusions



19

If navigation is not *immediately* obvious, number the elements or use arrows to guide the viewer through the poster.



20

**The center of the poster should feature the methods and results**

**Problem statement, motivation, objectives**

**Methods**

**Results**

**Applications or future work**

**Sources of additional information**

**Acknowledgments**

**Tip: Visually represent the relative importance of text elements**

21

**Position your important points strategically**

**Production of  $\Delta$  Particles from  $\Sigma^*$  Decays at HERMES**  
Cynthia Chiang, University of Illinois at Urbana-Champaign

**Tip: Position important information above the midline and in the center**

22

## Choose colors carefully

Colors affect how easily  
your poster can be read

Use a high contrast between  
background and text

“Warm” colors are more  
visible, but don’t  
overpower with orange  
(even Illini orange)

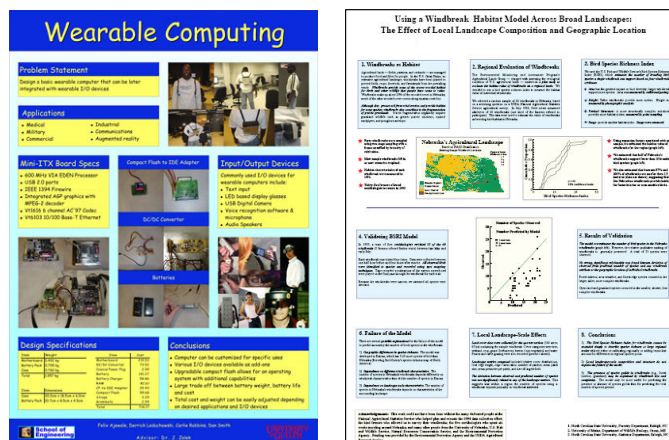
Avoid using red/green  
or red/blue

**Tip: Gradient backgrounds that look great  
on your monitor may not print properly**



23

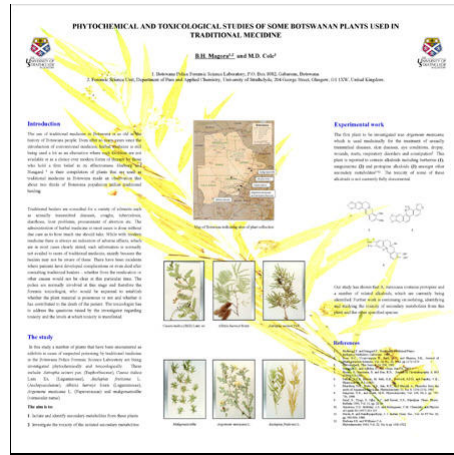
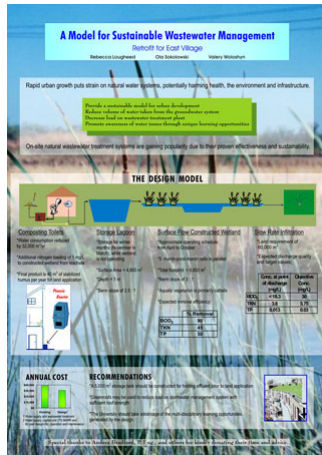
## Use color to highlight, separate, or associate information visually



**Tip: People expect color to mean  
something; don’t use color randomly**

24

## Choose neutral backgrounds with high-contrast text and images



25

## Leave adequate “white space”

Effective posters look uncluttered

Use white space to isolate and emphasize important details

Leave at least 1.5 in (4 cm) of white space between columns

Balance elements on the page

**Tip: Leave at least 0.5-in (1.25-cm) margins on all sides of your poster; no plotter prints to the very edge of the paper**

26

## “White space” doesn’t have to be white

**Radiative Transfer in Turbulent Interstellar Clouds**  
Charles Hansen: University of Illinois at Urbana Champaign

Motivation	Monte Carlo Radiative Transfer	Optical Depth and Turbulence	Results
<p><b>Radiative Transfer</b></p> <p>Goal: To study the radiative transfer properties of turbulent interstellar clouds.</p> <p>The Clouds:</p> <ul style="list-style-type: none"> <li>High density, molecular</li> <li>Typical sizes of many parsecs</li> <li>Mass numbers easily over 1000</li> </ul> <p>The Radiative Transfer:</p> <ul style="list-style-type: none"> <li>Non-parallel, computationally expensive</li> <li>Uniform density assumed previously</li> </ul> <p><b>Astrophysical Chemistry</b></p> <p>Light levels within a cloud can significantly alter the ionization and temperature of a cloud and give rise to interesting chemical compositions.</p> <p><b>Ambipolar Diffusion</b></p> <ul style="list-style-type: none"> <li>Clouds in strong magnetic fields cannot collapse</li> <li>Magnetic field must dissipate</li> <li>Dissipates through ambipolar diffusion</li> <li>Ambipolar diffusion is controlled by ionization fraction</li> </ul>	<p><b>Monte Carlo Method</b></p> <ul style="list-style-type: none"> <li>Many photons integrated through a cloud</li> <li>Directions chosen “randomly”</li> <li>The primary equation being solved:</li> </ul> $\frac{dI}{ds} = -I(\mu)(\text{Absorption} + \text{Scattering})$ <ul style="list-style-type: none"> <li>Integration produces an incoming flux and outgoing flux</li> <li>The fluxes yield an effective optical depth, <math>\tau</math></li> </ul> <p style="text-align: center;"><b>Simulated Clouds</b></p> <ul style="list-style-type: none"> <li>Simulated with ZEUS algorithm</li> <li>Isothermal</li> <li>Compressible Ideal Gas</li> <li>Magnetohydrodynamic</li> <li>Swept over much number and magnetic field strength</li> </ul>	<p><b>Optical Depth and Turbulence</b></p> <ul style="list-style-type: none"> <li>Increased turbulence → Decreased <math>\tau</math></li> <li>Light goes through “light tubes” of low density</li> <li>More turbulence → More light tubes</li> <li><math>\tau</math> can go as low as 50% of its smooth density value</li> </ul> <p><b>Esther Wood</b></p> <p>The radiation observations have been used. SHE is still performing more extensive quantitative analysis.</p>	<p><b>Results</b></p> <ul style="list-style-type: none"> <li>Light tubes align with magnetic fields</li> <li>Clouds more transparent in direction of light tubes</li> <li>~10% difference with 00° rotation</li> </ul> <p><b>Anisotropy</b></p> <p>Alignment of Light Tubes with Magnetic Fields</p> <p>Highly inhomogeneous density in a cloud with turbulent magnetic field</p> <p>View of a cloud that features magnetic field aligned light tubes</p> <p><b>Adriano de la Fuente</b></p> <p>The physics is simulated by CLOUDS. Compare with existing ROSAT giant AOT 00-00091</p>

Courtesy Charles Hansen

27

## You must have an “acknowledgments” section on your poster

First, get it spelled correctly—no *e* following the *g* in the US English spelling of *acknowledgment*

(Don’t believe me?—look at the acknowledgment page of any book published by a US publisher)

British English spells it with the “e,” but we colonials have our own rules

Some wimpy dictionaries may accord “acknowledgement” alternative status, but we have higher standards in physics

28

## **Acknowledge research contributions by people other than the authors**

**Persons who gave scientific guidance,  
participated in discussions, or shared  
unpublished results, data, or samples**

**Persons who provided facilities or equipment**

**Assistants or students who helped do the  
work**

**Technicians at user facilities or labs**

**Tip: Make it a simple statement of thanks,  
not a testimonial or dedication**

29

## **Acknowledge by name only**

**Do not use titles, honorifics, positions, or  
awards**

**Paul G. Kwiat**

**NOT**

**Professor Paul G. Kwiat,  
Bardeen Chair in Physics**

**Anthony J. Leggett**

**NOT**

**Sir Dr. A.J. Leggett, Nobel Laureate**

30

## Always acknowledge financial support of the research—always

Give the name of the funding agency and grant or contract number

“This material is based upon work supported by the National Science Foundation under Grant No. \_\_\_\_.”

On posters, the following disclaimer must be included for NSF-funded research:

“Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.”

31

## What about logos?

Federal funding agencies may allow you to use their logos, but obtain a high-resolution image and follow their guidelines

The University has explicit rules about the use of the I-mark

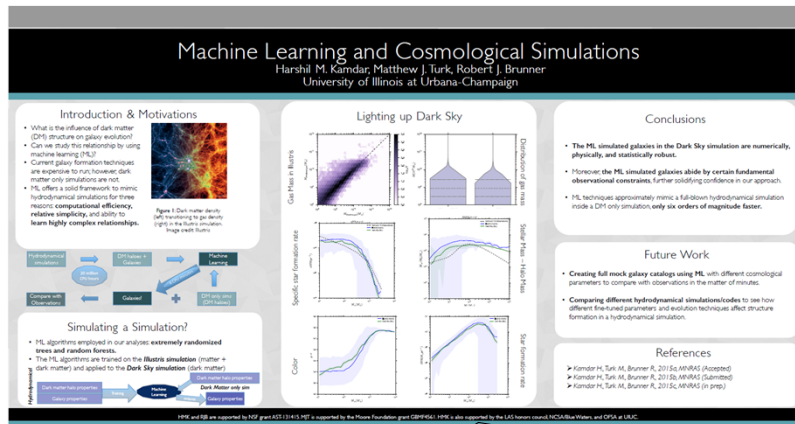
Companies are aggressive about protecting their brands and trademarks; just because you can grab a logo off a website does *not* mean you can use it with impunity



32



## Where to put the acknowledgments?



**Smaller font**  
**At the bottom**  
**Lower right corner**

HMK and RJB are supported by NSF grant AST-131415. MJT is supported by the Moore Foundation grant GBMF4561. HMK is also supported by the LAS honors council, NCSA/Blue Waters, and OFSA at UIUC.

33

## Prepare a “stump speech” to introduce your poster

Should be 1–2 min.

Briefly state

1. What you studied and why it’s important
2. What methods you used
3. What your principal results are
4. What you think they mean
5. What you’re going to do next

Prepare two versions—one for experts and one for novices

Be prepared to be interrupted with questions; rehearse possible answers

34

## Coordinate the elements of your stump speech to the sections of your poster

### Stump speech:

1. What you studied/ why it's important
2. What methods you used
3. What your principal results are
4. What you think they mean
5. What you're going to do next

### Poster:

1. Motivation
2. Methods
3. Results
4. Conclusions
5. Future work

35

## Point to the different sections of the poster as you're talking

### Characterization of superconducting $\text{La}_{2-x}\text{Ba}_x\text{CuO}_4$ thin films

Mounir Fizari, Adam Weis, and Dale Van Harlingen  
University of Illinois at Urbana–Champaign

<p><b>Motivation</b></p> <p><b>Stripe Order</b></p> <ul style="list-style-type: none"> <li>Ordering of alternating antiferromagnetic and charge rich lines</li> <li>Arises in hole-doped Mott insulators</li> <li>Relationship with superconductivity in cuprates poorly understood</li> </ul> <p><math>\text{La}_{2-x}\text{Ba}_x\text{CuO}_4</math> (LBCO)</p> <ul style="list-style-type: none"> <li>High-<math>T_c</math> superconductor; transition temperature <math>T_c</math> varies with barium concentration (hole doping), <math>x</math></li> <li>Superconductivity strongly suppressed as stripe order emerges</li> <li>LBCO thin films used in neutron, X-ray, and transport experiments to study stripe order; grown from bulk LBCO targets by pulsed laser deposition (PLD)</li> </ul> <p><i>Previous experiments: How does film quality change with PLD growth parameters? This experiment: How does film behavior change with target doping?</i></p>	<p><b>Approach: Characterization</b></p> <ul style="list-style-type: none"> <li><b>Misotropy Effect:</b> Film exhibits magnetic field below <math>T_c</math> as field applied, smoother around each measure gradient</li> <li><math>T_c \rightarrow</math> film doping</li> <li><math>T_B \rightarrow</math> homogeneity</li> </ul> <p><b>Hall effect:</b> <math>V_H</math> generated perpendicular to both applied field and current</p> <ul style="list-style-type: none"> <li>Devices fabricated using photolithography</li> <li><math>R_H \gg</math> sign and density of charge carriers</li> <li><b>Magnetotarget:</b> How resistance changes with field and temperature</li> <li>Confirms magnetic transition data</li> </ul> <p><math>R_H = \frac{V_H d}{I B} = \frac{1}{q n v_d}</math> <math>n_p \rightarrow</math> charge carriers/ volume</p>	<p><b>Results: Hall effect and magnetotransport</b></p> <p><b>Hall coefficient temperature dependence</b></p> <ul style="list-style-type: none"> <li>7% difference between measured and expected <math>R_H</math></li> <li><math>R_H</math> nearly linear before onset of ordered phase</li> <li><math>R_H(T &lt; T_c)</math> inaccessible, fields too weak to fully suppress superconductivity</li> </ul> <p><b>Transport field and temperature dependence</b></p> <ul style="list-style-type: none"> <li>Reduced <math>T_c</math> at high field <math>\rightarrow</math> vortex flow</li> <li>LBCO known to be most sensitive to field at optimal doping (strongest emergence of quasi-2D states: layered vortex liquid and layered phase-decoupled superconductor)</li> <li>Overdoped film shows largest field sensitivity, consistent with barium loss</li> </ul>
<p><b>Approach: Growth</b></p> <ul style="list-style-type: none"> <li><b>Pulsed laser deposition</b> vs evaporation laser (LBCO target <math>\rightarrow</math> ejected material carried in oblique plane <math>\rightarrow</math> optimal LBCO deposited on <math>\text{LaAlO}_3</math> substrate)</li> <li>Several films grown from each of three bulk LBCO targets, <math>x = 0.095, 0.125, 0.155</math></li> <li>Stoichiometry and optical profilometry: 60–150 nm film thickness</li> </ul>	<p><b>Results: Magnetic transitions</b></p> <p><b>Barium-doped:</b> <math>x_{opt} = 0.095</math>    <b>Optimally-doped:</b> <math>x_{opt} = 0.125</math>    <b>Underdoped:</b> <math>x_{opt} = 0.155</math></p> <p><b>Average <math>T_c</math>'s: 1% loss of barium concentration at each target doping</b></p> <ul style="list-style-type: none"> <li>Strat transitions: inhomogeneity</li> <li>Scanning electron microscopy: growth particulates present regardless of target doping</li> </ul>	<p><b>Summary / Future work</b></p> <p><b>Summary</b></p> <ul style="list-style-type: none"> <li>Consistent barium loss in PLD grown LBCO thin films corroborated by measurements of</li> <li>Magnetic superconducting transitions</li> <li>Hall coefficient</li> <li>Transport in magnetic field</li> <li>Defects constant across target doping</li> </ul> <p><b>Future Work</b></p> <ul style="list-style-type: none"> <li>Reduce barium loss and defect density</li> <li>Further transport studies</li> <li>Grow films with intentional doping gradients</li> </ul> <p><b>Acknowledgments</b></p> <p><small>Thanks to Mark Thompson and Professor Peter Schlegel for their generous donation of the LBCO thin film targets used in this experiment. This work was supported by the National Science Foundation (NSF) Grant DMR-1801000 and the University of Illinois at Urbana-Champaign.</small></p>

36

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18

## Prepare two versions of your stump speech

### Non-experts:

- Emphasize the “big picture”
- Explain what’s new and why it’s important
- Use simple words—no acronyms or jargon
- Don’t get bogged down in technical details

### Experts:

- More technical language
- More detailed explanations of methods and results
- More math

37

## Rehearse both versions



**Out loud**

**In front of real people**

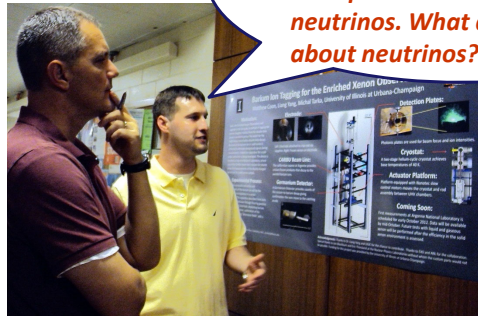
**Okay to write it out first, but practice until you can deliver your lines without notes**

38

## How do you know which version to give?

# ASK!

*Hi, I'm Matt. Thanks for stopping by. I'm working on an experiment to detect neutrinos. What do you know about neutrinos?*



39

## Be prepared to be interrupted with questions during your speech

Respond to a question as soon as it is asked, don't just keep rattling off your speech

*That's a great question. We're interested in them because they are a candidate for dark matter.*



40

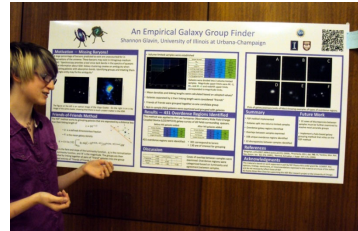
## Rules for answering questions:

**Always be respectful**

**If you don't understand the question, ask for clarification**

**If the question is off-topic, redirect**

**Don't ever argue with a questioner—you'll just look bad**



PHYS 499 Posters, October 2012; Shannon Glavin

**If you don't know the answer, just say so\***

**\*Make a note of it to ask your adviser!**

**\*Ask for the person's email address and say you'll find out the answer and send it to him or her.**

41

## Find out *before* your session . . .

**The location and time by which your poster is to be displayed**

**What kind of surface your poster will be mounted on**

**Whether you need to provide your own tape, thumbtacks, Velcro strips...**

**Whether other needed equipment will be provided (electrical outlet, table, easel)**

**Tip: Don't expect the meeting organizers to supply you with anything other than space**

42

## **Tips for successfully presenting your poster:**

**Arrive early (early birds usually get the desirable locations)**



**Bring your own “poster hanging” emergency kit**

**Have your “stump speech” prepared to explain your work to visitors**

- Give the big picture
- Explain why the work is important
- Have two versions—one for experts and one for non-experts

**Greet each visitor with a smile; ask questions to elicit interest and level of understanding**

43

## **Be prepared to mount your poster on any surface**

**Your poster-hanging toolkit should include:**

- Push pins or thumbtacks
- Straight pins or drawing pins
- Plastic mounting putty
- Velcro® strips and glue
- Clear PCV tape or masking tape
- Scissors



**Have a permanent marker the color of your text for emergency typo corrections**

**Have a small notebook and pen handy for notes**

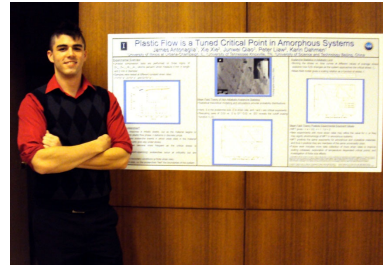
44

## Convey your enthusiasm for your research project

Greet people as they walk up to your poster

By your stance and expression, invite them to ask questions

Have your business cards, copies of your paper, or other handouts ready



PHYS 499 Posters, October 2012; James Antonaglia

**Tip: Open your hands, lean forward, and smile**

45

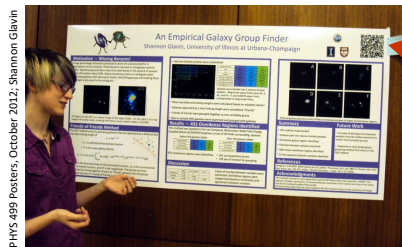
## Have hand-outs available

A miniature version of your poster

An extended abstract or a summary

Reprints or preprints

Include your complete contact information



PHYS 499 Posters, October 2012; Shannon Glavin

**Tip: use a QR code to link to the group's web site or a copy of the paper**

**Tip: an 11-in × 17-in sheet of paper, folded in half, gives you four pages for additional information about your work in one handout**

46

**Some advice from the experts:**

**Never ever put  
*anything* on your  
poster that you do  
not thoroughly  
understand**



47

**That figure you got from somebody else  
and added at the last minute...**



**...will be all the audience asks questions about**

48



## **Some final advice:**

**Eat breakfast (or lunch) before your session**

**Take a bottle of water with you—it's hard to talk when your mouth feels like a desert**

**Wear comfortable shoes**

**Wear clothes that are loose enough you can point to things on your poster**

**Take pride in what you've learned and done—don't apologize**

**Relax and have fun**



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