

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?

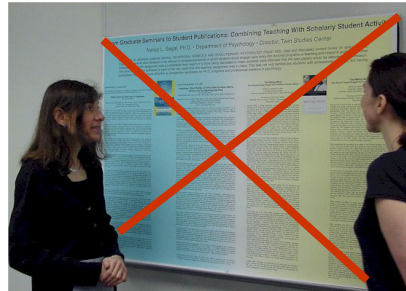
In plots?

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

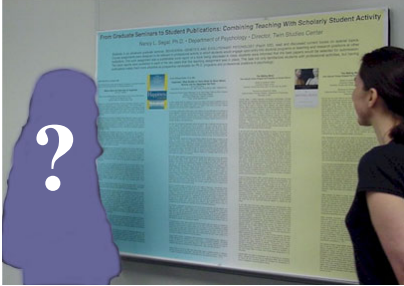
Use the visual elements of the poster to tell the story

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

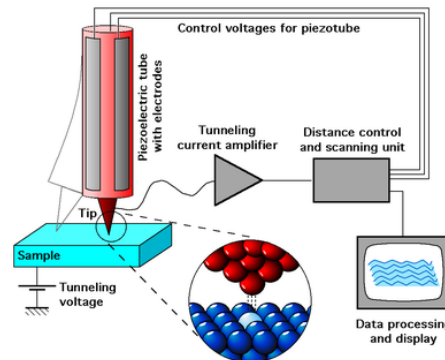
Crop and enlarge photos and simplify drawings to focus attention on important details

Scan photos at 300 dpi

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

6

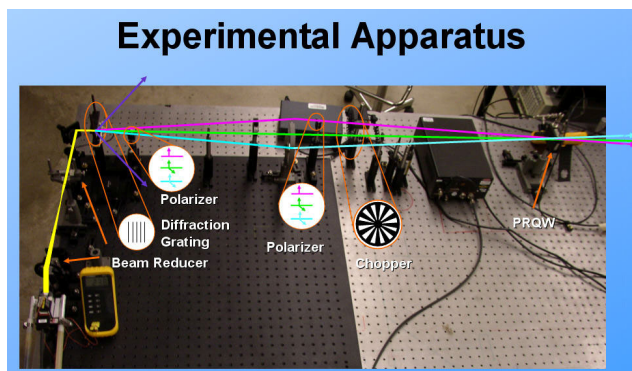
Don't use pointless graphics



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

7

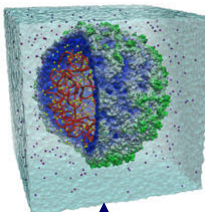
This excellent graphic shows the apparatus *and* the process



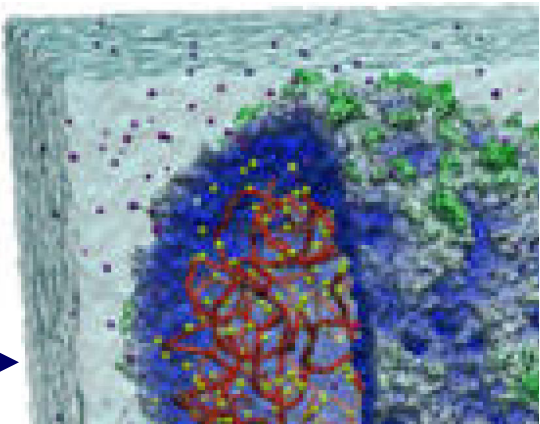
Tip: Show pictures of equipment only if they are related to an important idea that you want to convey

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.


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Make every graphic mean something; avoid “eye candy”


Improving the Cooling of Blades and Vanes in Gas Turbine Engines

VT EXCEL

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

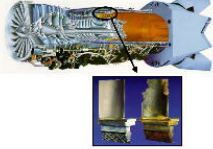


Jet engines

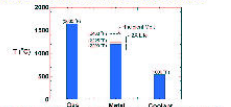


Power turbines

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

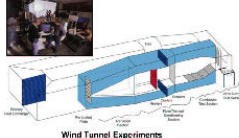


Better cooling schemes can dramatically affect the life of blades and vanes in gas turbines




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


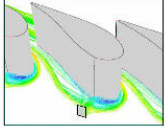


Wind Tunnel Experiments

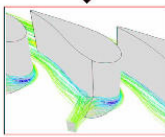


Computational Predictions

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

Without Fillet: Unwanted Vortices

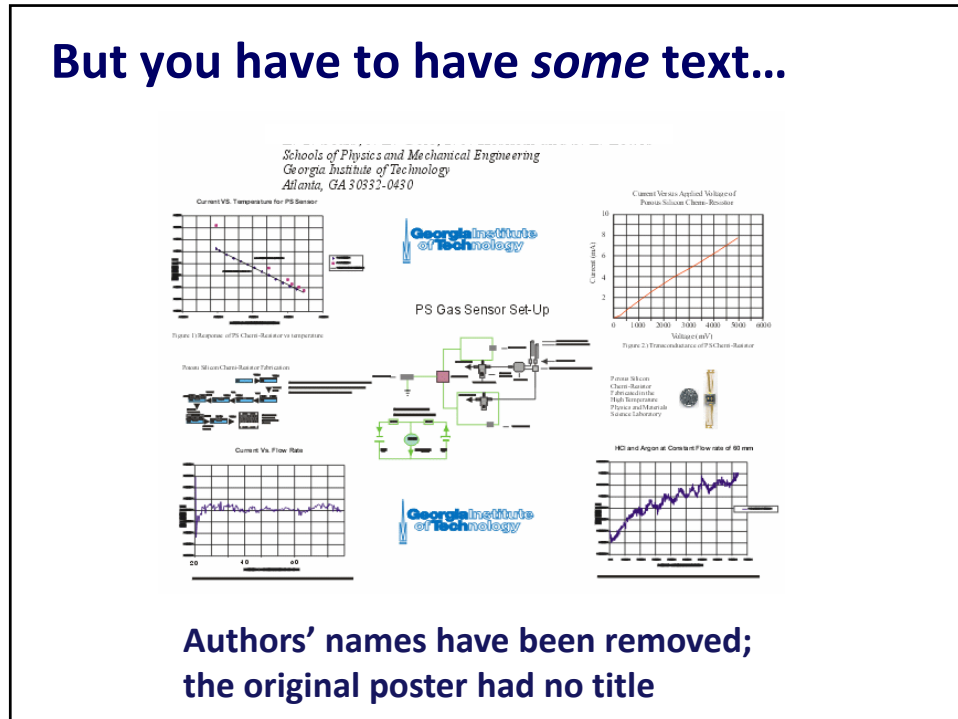


With Fillet: Vortices Reduced

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

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But you have to have some text...



Authors' names have been removed;
the original poster had no title

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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

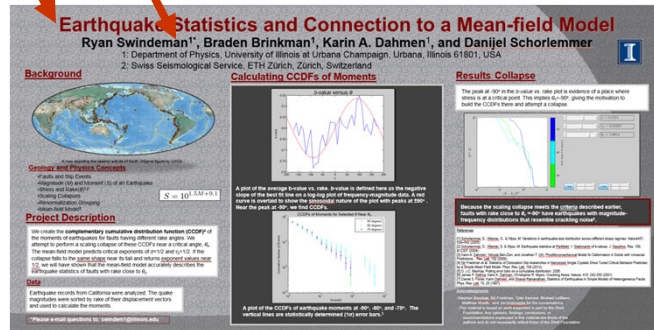
Tip: Scale the font with the size of the poster

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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



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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

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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...**

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



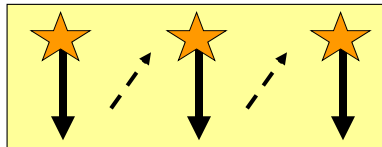
Tip: Don’t put important points in tiny print at the bottom

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”)

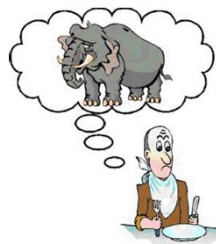
Put important points at the top of each column



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

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How is the viewer going to navigate through this poster?



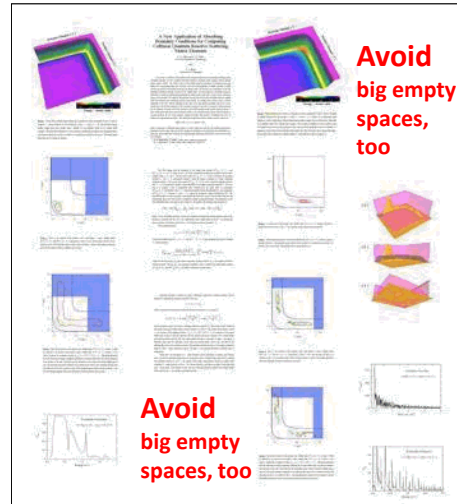
18

Use headings to guide the viewer through the poster

Make your key points immediately recognizable

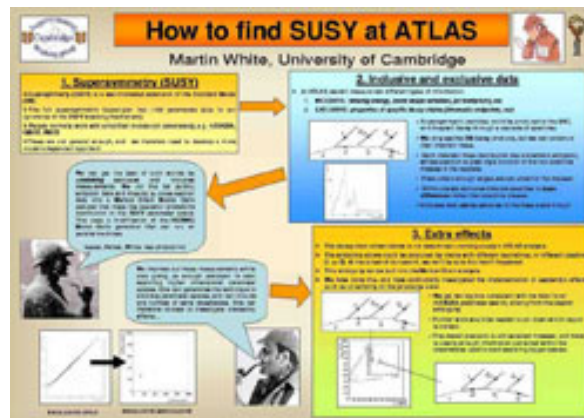
Use headings to help viewers locate what interests them

- Motivation
- Methods
- Results
- Conclusions



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



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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

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Position your important points strategically

Production of Δ Particles from Σ^* Decays at HERMES
Cynthia Chiang, University of Illinois at Urbana-Champaign

Background

- Examine spin transfer through fragmentation process
- Study spin structure of Δ particles produced in deep-inelastic scattering (DIS) events

The HERMES experiment

- Major physics experiment for studying spin structure of particles
- Located at the Deutscher Elektronen Synchrotron (DESY) in Hamburg, Germany
- Longitudinally polarized 27.5 GeV positron beam
- Gas target (operated by the various member experimental groups)

The problem

SIGMA CONTAMINATION!

- Contribution between theory and background?
- Three viable models
- These conventional models that attempt to model σ -dependence or σ dependence of σ
- Possible problem: σ can also be produced in decay product of another Particle, such as Σ^*
- Can σ contribute to the discrepancy between theory and experiment?

The hunt for Σ^*

- Step 1: Identify events in data containing Σ^* candidates
- Step 2: Develop methods for identifying Σ^* by examining Particle Correlations
- Step 3: Find Σ^* in data (events containing Σ^* candidates) from Particle Correlation
- Step 4: Use Particle Correlation to determine fraction of σ particles produced in decay
- Step 5: Use results to develop models for the longitudinal spin transfer process

Results

- Multiple identified Σ^* candidates in the data
- Can Σ^* contribute to the discrepancy between theory and experiment?
- Can and Particle Correlation methods help in analysis code or other Particle Correlation?

Future plans

- Identify and Particle Correlation
- Contribution to section 2, but also from 2: develop code for identifying Σ^* candidates in the data
- Find fraction of σ particle production σ decay products
- After 2, 2 contribution is determined, it will be possible to correctly interpret spin transfer data

Courtesy H. Chiang

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

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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)

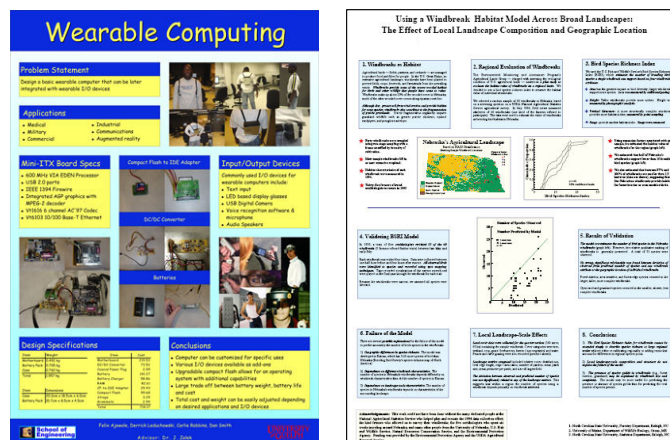
Avoid using red/green
or red/blue

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



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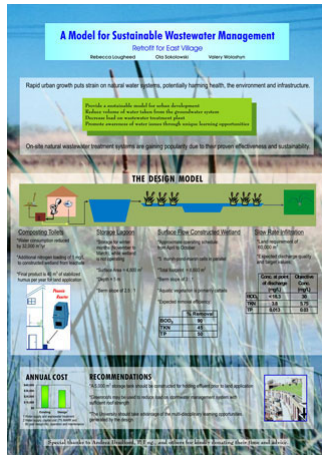
Use color to highlight, separate, or associate information visually



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

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Choose neutral backgrounds with high-contrast text and images



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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

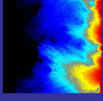
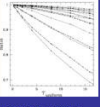

Balance elements on the page

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

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“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>Radiative Transfer</p> <p>Goal: To study the radiative transfer properties of turbulent interstellar clouds.</p> <p>The Clouds:</p> <ul style="list-style-type: none"> High density, molecular Typical sizes of many parsecs Mass numbers easily over 1000 <p>The Radiative Transfer:</p> <ul style="list-style-type: none"> Non-parallel, computationally expensive Uniform density assumed previously <p>Astrophysical Chemistry</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>Ambipolar Diffusion</p> <ul style="list-style-type: none"> Clouds in strong magnetic fields cannot collapse Magnetic field must dissipate Dissipates through ambipolar diffusion Ambipolar diffusion is controlled by ionization fraction 	 <p>Monte Carlo radiative transfer of a dense, filamentary interstellar cloud. Photons are tracked as they propagate through the cloud.</p> <p>Monte Carlo Method</p> <ul style="list-style-type: none"> Many photons integrated through a cloud Directions chosen “randomly” The primary equation being solved: $\frac{dI}{ds} = -I(\mu)(\text{Absorption} + \text{Scattering})$ <ul style="list-style-type: none"> Integration produces an incoming flux and outgoing flux. The fluxes yield an effective optical depth, τ <p style="text-align: center;">Simulated Clouds</p> <ul style="list-style-type: none"> Simulated with ZEUS algorithm Isothermal Compressible Ideal Gas Magnetohydrodynamic Swept over much number and magnetic field strength 	<p>Optical Depth and Turbulence</p> <ul style="list-style-type: none"> Increased turbulence → Decreased τ Light goes through “light tubes” of low density More turbulence → More light tubes τ can go as low as 50% of its smooth density value  <p>Optical depth of the cloud is calculated by Monte Carlo radiative transfer. The optical depth is shown as a function of density. Each line is a different path through the cloud. The lines show significant scatter.</p>	<p>Results</p> <ul style="list-style-type: none"> Light tubes align with magnetic fields Clouds more transparent in direction of light tubes ~10% difference with 00° rotation <p>Anisotropy</p> <p>Alignment of Light Tubes with Magnetic Fields:</p>  <p>Light tubes align with magnetic fields.</p> <p>Clouds more transparent in direction of light tubes.</p> <p>~10% difference with 00° rotation.</p> <p>Esther Wood</p> <p>The radiation anisotropy has been used by ESTHER WOOD to study the effects of magnetic fields on the collapse of a cloud that contains magnetic fields. It shows a clear effect on the collapse.</p> <p>Acknowledgments</p> <p>This research is supported by CAREER Grant AST-00-50591.</p>

Courtesy Charles Hansen

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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

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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**

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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

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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.”

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What about logos?

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

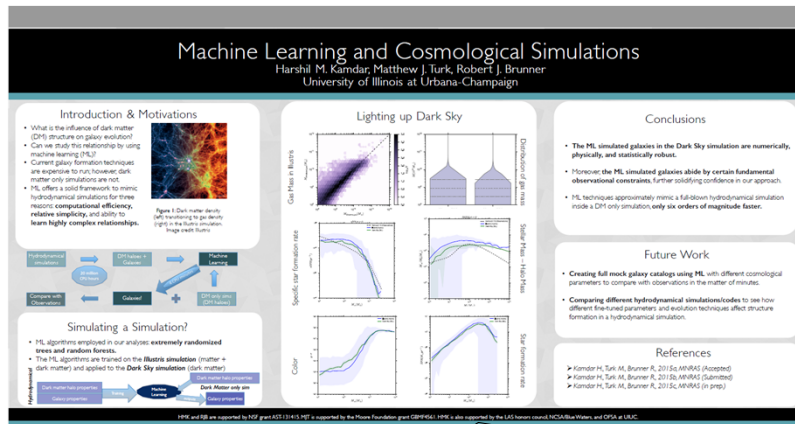
The University has explicit rules about the use
of the I-mark

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



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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.

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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

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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

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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>Motivation</p> <p>Stripe Order</p> <ul style="list-style-type: none"> Ordering of alternating antiferromagnetic and charge rich lines Arises in hole-doped Mott insulators Relationship with superconductivity in cuprates poorly understood <p>$\text{La}_{2-x}\text{Ba}_x\text{CuO}_4$ (LSCO)</p> <ul style="list-style-type: none"> High-T_c superconductor; transition temperature T_c varies with barium concentration (hole doping). Superconductivity strongly suppressed as stripe order emerges. LSCO thin films used in neutron, X-ray, and transport experiments to study stripe order; grown from bulk LSCO targets by pulsed laser deposition (PLD). <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>Approach: Characterization</p> <ul style="list-style-type: none"> Misotropy Effect: Film exhibits magnetic field below T_c as field applied, smoother second order measure gradient $T_c \rightarrow$ film doping $T_B \rightarrow$ homogeneity <p>Hall effect: V_H generated perpendicular to both applied field and current</p> <ul style="list-style-type: none"> Devices fabricated using photolithography $R_H \rightarrow$ sign and density of charge carriers Magnetotarget: How resistance changes with field and temperature Confirms magnetic transition data <p>$R_H = \frac{V_H d}{I B} = \frac{1}{q n v_d}$ $n_p \rightarrow$ charge carriers/ volume</p>	<p>Results: Hall effect and magnetotransport</p> <p>Hall coefficient temperature dependence</p> <ul style="list-style-type: none"> 7% difference between measured and expected R_H R_H nearly linear before onset of ordered phase $R_H(T < T_c)$ inaccessible, fields too weak to fully suppress superconductivity <p>Transport field and temperature dependence</p> <ul style="list-style-type: none"> Reduced T_c at high field \rightarrow vortex flow LSCO known to be most sensitive to field at optimal doping (strongest emergence of quasi-2D states: layered vortex liquid and layered phase-decoupled superconductor) Overdoped film shows largest field sensitivity, consistent with barium loss
<p>Approach: Growth</p> <ul style="list-style-type: none"> Pulsed laser deposition vs evaporation laser (LSCO target \rightarrow ejected material carried in oblique plane \rightarrow optimal LSCO deposited on LaAlO_3 substrate) Several films grown from each of three bulk LSCO targets (x = 0.095, 0.225, 0.355) Stoichiometry and optical profilometry: 60–150 nm film thickness 	<p>Results: Magnetic transitions</p> <p>Subdoped: $x_{\text{opt}} = 0.095$ Optimally doped: $x_{\text{opt}} = 0.225$ Overdoped: $x_{\text{opt}} = 0.355$</p> <p>Average T_c's: 1% loss of barium concentration at each target doping</p> <ul style="list-style-type: none"> Broad transitions: inhomogeneity Scanning electron microscopy: growth particulates present regardless of target doping 	<p>Summary / Future work</p> <p>Summary</p> <ul style="list-style-type: none"> Consistent barium loss in PLD grown LSCO thin films corroborated by measurements of Magnetic superconducting transitions Hall coefficient Transport in magnetic field Defects constant across target doping <p>Future Work</p> <ul style="list-style-type: none"> Reduce barium loss and defect density Further transport studies Grow films with intentional doping gradients <p>Acknowledgments</p> <p><small>Thanks to Mark Hengge and Professor Van Harlingen for their guidance. This research was supported by the National Science Foundation (NSF) for awarding grants and support, which did not constitute endorsement by the federal government. The authors also acknowledge the support of the University of Illinois at Urbana-Champaign and the Center for Experimental Research in Superconductivity.</small></p>

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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

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Rehearse both versions



Out loud

In front of real people

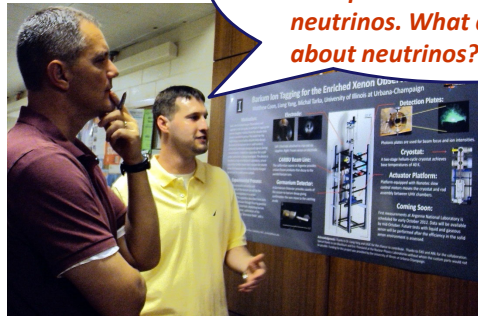
Okay to write it out first, but practice until you can deliver your lines without notes

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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?



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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.



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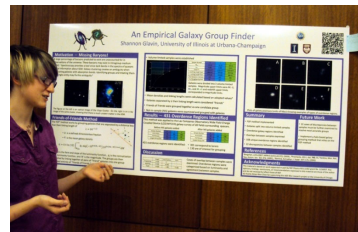
Rules for answering questions:

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**

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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

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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

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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

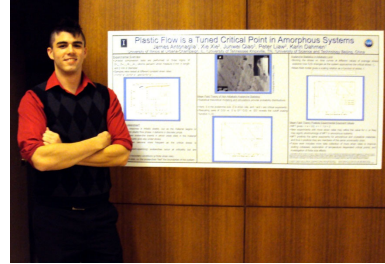
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Convey your enthusiasm for your research project

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

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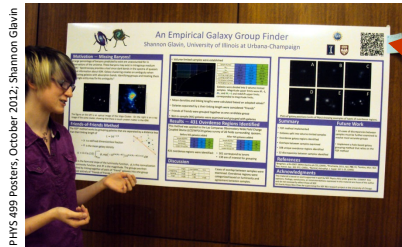
Have hand-outs available

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

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Some advice from the experts:

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



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



...will be all the audience asks questions about

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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



cmelliot@illinois.edu

<http://physics.illinois.edu/people/Celia/>