

Effective Posters— *Presenting your Results Clearly and Persuasively*



Courtesy Carlos A. Alvarez Zarikian

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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

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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?

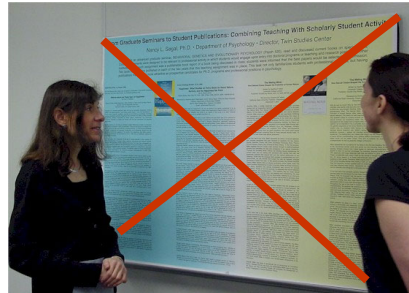
In words?

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

3

3

Use the visual elements of the poster to tell the story



4

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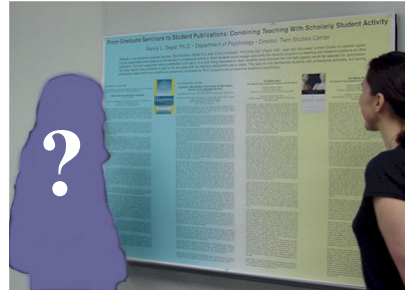
Use the visual elements of the poster to tell the story

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

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



Helix Nebula

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

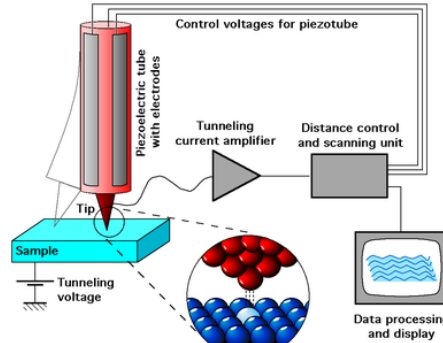
Provide a brief caption for every graphic—tell people what they are looking at

Put a “drop shadow” behind images to make them pop off the flat poster

6

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Don't use pointless graphics



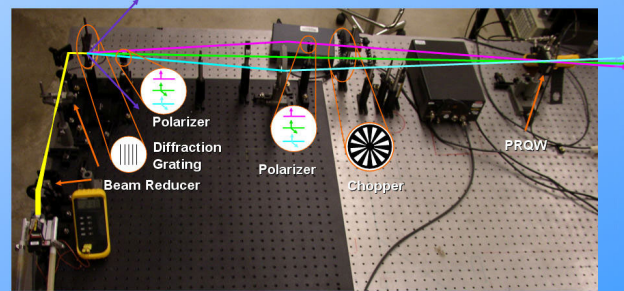
Your project used a scanning tunneling microscope to characterize your thin-film superconducting samples. Which is a better image for your poster?

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This excellent graphic shows the apparatus *and* the process

Experimental Apparatus

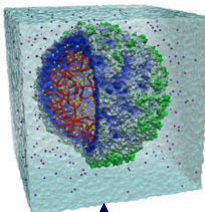


Tip: Show pictures of equipment only if they are related to an important idea that you want to convey

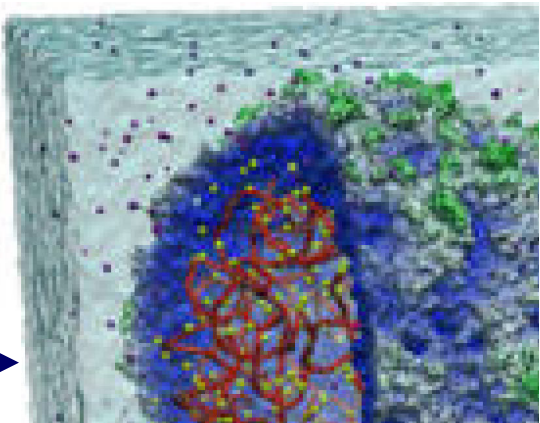
8

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Avoid using graphics taken from the Internet; they're too low-res (72-dpi) to print acceptably



Theoretical and Computational Thermofluidics 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

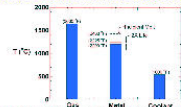
VTCC

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



Jet engines


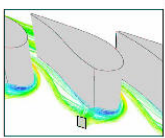
Better cooling schemes can dramatically affect the life of blades and vanes in gas turbines



Cooling Scheme	Temperature (°C)
Dir.	~1500
Axial	~1200
Cooling	~800

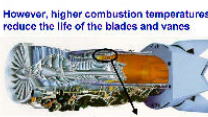
If a cooling scheme can decrease the temperature that a blade experiences by 20°C, the blade's life will double

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

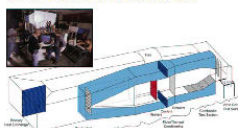



Without Fillet: Unwanted Vortices

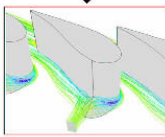
However, higher combustion temperatures reduce the life of the blades and vanes



Our laboratory studies cooling schemes through experiments and computations




Wind Tunnel Experiments



With Fillet: Vortices Reduced

Computational Predictions

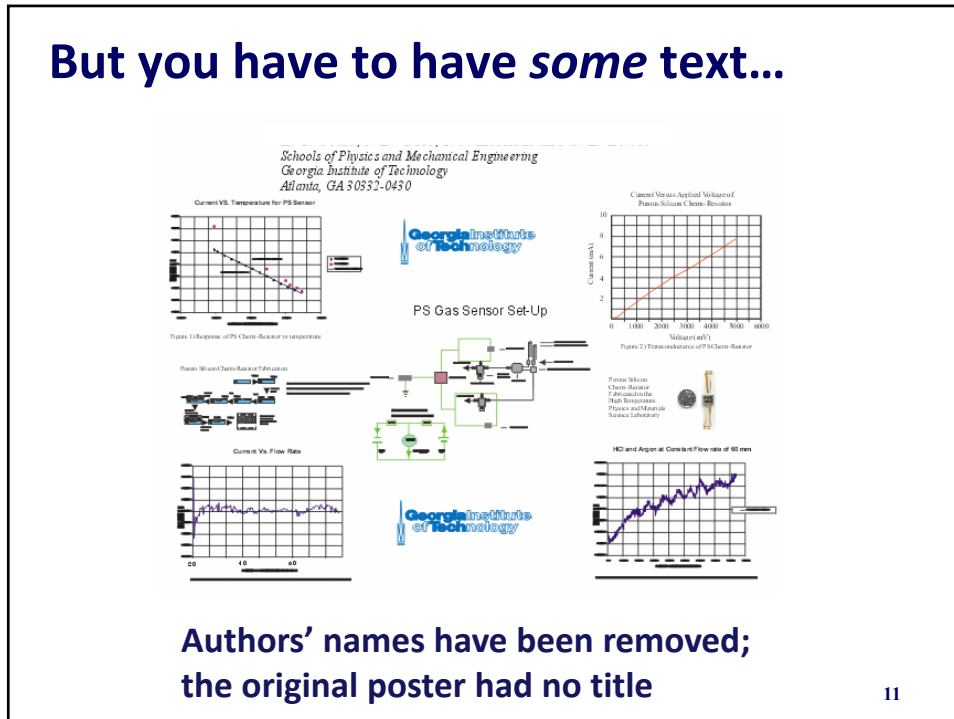


In summary, we are improving the cooling of blades and vanes in gas turbine engines

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But you have to have *some* text...



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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

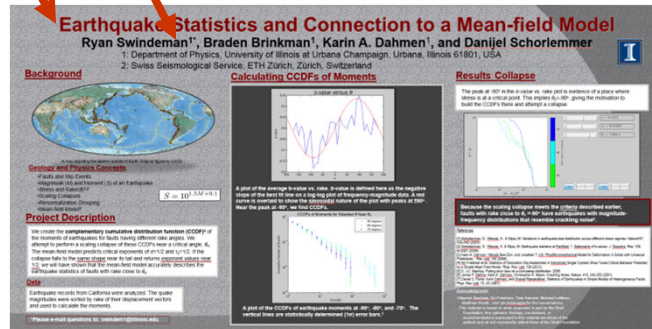
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Every poster must have a “headline” (title) and a “byline” (authors)

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

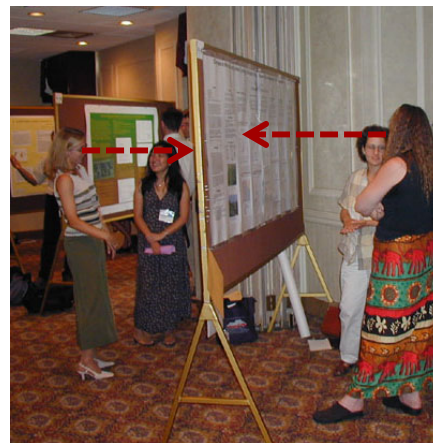
If you *must* include an abstract, keep it very brief (<100 words)

***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

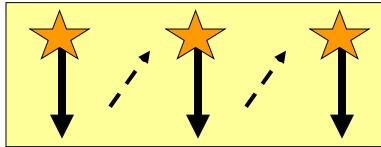
16

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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?



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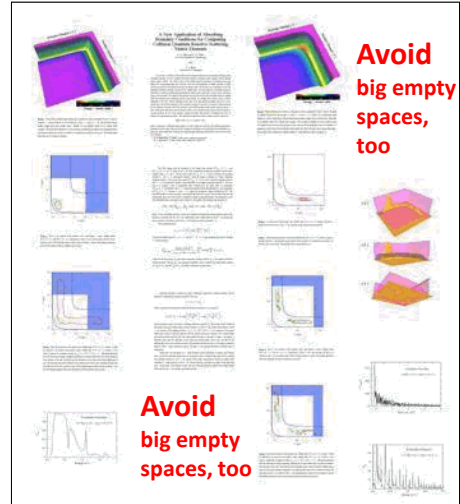
18

Use headings to guide the viewer through the poster

Make your key points immediately recognizable

Use headings to help viewers locate what interests them

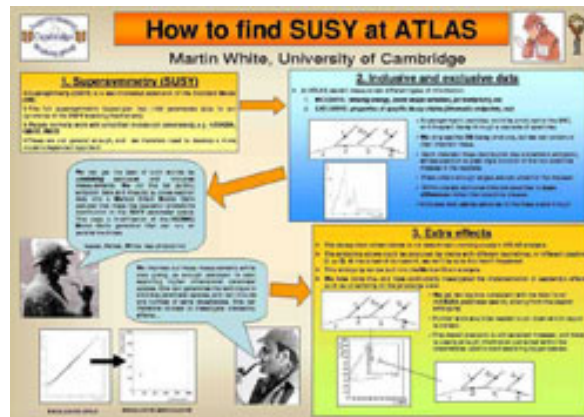
- Motivation
- Methods
- Results
- Conclusions



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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

- Builds physics experiment for studying spin structure of particles
- Located at the Deutscher Elektronen Synchrotron (DESY) in Hamburg, Germany
- Largely funded by the DFG (German Research Foundation)
- Can target polarized Fe, various nuclear experimental gases

The problem

SIGMA CONTAMINATION!

- Contradiction between theory and observations?
- These spin observables
- These spin observables that attempt to extract Δ spin structure for all high values of x_F
- Visible evidence: even after deconvolution of decay products of in-flight protons, neutron, Δ
- Can Δ contamination explain 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 Herme Contamination
- Step 3: Find Σ^* in data (events containing Σ^* candidates) from Herme Cont. P. results
- Step 4: Use Herme Cont. to determine fraction of Δ particles produced in decay of Σ^*
- Step 5: Use results to develop models for the longitudinal spin transfer

Results

- Spin transfer observables for Δ production
- Spin transfer observables for Σ^* production

Future plans

- Data and Herme Cont. re-examination
- Re-examination of only Herme Cont. but also Herme Cont. development for identifying Σ^* candidates in the data
- Final reduction of spin transfer observables for Σ^* production
- After 2, 3, or contribution to Δ observables, if all is possible to identify identified spin transfer data

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)

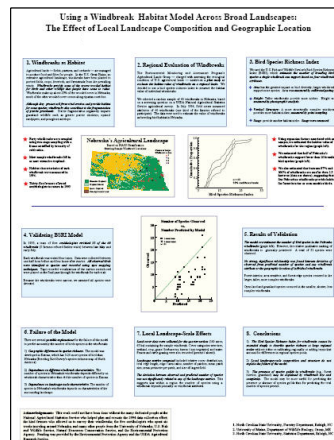
Avoid using red/green or red/blue

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



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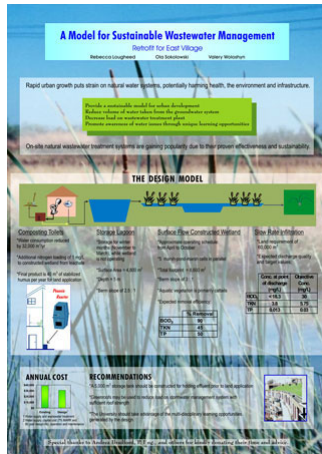
Use color to highlight, separate, or associate information visually



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

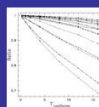
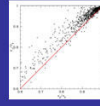

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“White space” doesn’t have to be white

Radiative Transfer in Turbulent Interstellar Clouds

Charles Hansen: University of Illinois at Urbana Champaign

<p>Motivation</p> <p><u>Radiative Transfer</u></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 • Much numbers easily over ten <p>The Radiative Transfer:</p> <ul style="list-style-type: none"> • Non-analytic, computationally expensive • Uniform density assumed previously <p><u>Astrophysical Chemistry</u></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><u>Ambipolar Diffusion</u></p> <p>• Gas is being magnetically decoupled</p> <ul style="list-style-type: none"> • Magnetohydrodynamic (MHD) instabilities • Ambipolar diffusion is coupled by collisional friction 	<p>Monte Carlo Radiative Transfer</p> <p><u>Monte Carlo Method</u></p> <ul style="list-style-type: none"> • Many photons integrated through a cloud • Directions chosen “randomly” <p>The primary equation being solved:</p> $\frac{dI}{ds} = -I(\mu_{\text{absorption}} + \mu_{\text{scattering}})$ <ul style="list-style-type: none"> • Integration produces an incoming flux and outgoing flux • The fluxes yield an effective optical depth, T <p><u>Simulated Clouds</u></p> <ul style="list-style-type: none"> • Simulated with ZEUS algorithm • Isothermal • Compressible Ideal Gas • Swept over mesh number and magnetic field strength 	<p>Results</p> <p><u>Optical Depth and Turbulence</u></p> <ul style="list-style-type: none"> • Increased turbulence → Decreased T • Light goes through “light tubes” of low density • More turbulence → More light tubes • T can go as low as 50% of its smooth density value  <p><u>Anisotropy</u></p> <ul style="list-style-type: none"> • Light tubes align with magnetic fields • Clouds more transparent in direction of light tubes • ~10% difference with OD^2 relation  <p><u>Alignment of Light Tubes with Magnetic Fields:</u></p>  <p><u>Future Work</u></p> <p>The quantitative observations have been made. We will perform more extensive quantitative analysis.</p> <p><u>Acknowledgments</u></p> <p>This project was supported by C.J. Clark's Gamma-ray tracing from NSF grant AST-09-53059.</p>
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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 US 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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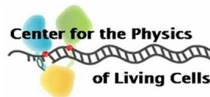
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What about logos?

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

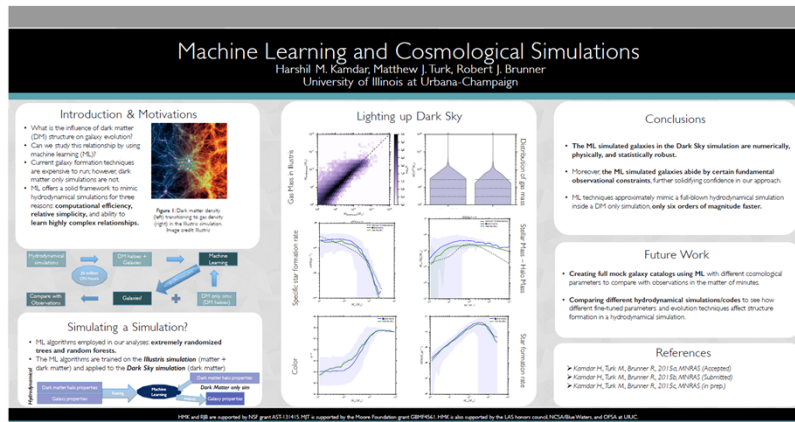
Companies are aggressive about protecting their brands and trademarks; just because you can grab a logo off a website does *not* mean you can use it with impunity



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Where to put the acknowledgments?



Courtesy Harshil Kamdar

Lower right corner
Under the “byline”
Along the bottom
margin

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 Relationships with superconductivity in cuprates poorly understood <p>$\text{La}_{2-x}\text{Ba}_x\text{CuO}_4$ (LSCO)</p> <p>High-T superconductor; transition temperature T_c varies with barium concentration (hole-doping), x</p> <ul style="list-style-type: none"> 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>Phase Diagram of LSCO</p> <p>Previous statements: How does film quality change with PLD growth parameters? This experiment: How does film behavior change with target doping?</p>	<p>Approach: Characterization</p> <ul style="list-style-type: none"> Misner Effect: Film expels magnetic field below T_c as field applied, counter-wound coils measure gradient <p>$T_c \rightarrow$ film doping $T_c \rightarrow$ homogeneity</p> <p>Hall effect: V_H generated perpendicular to both applied field and current</p> <ul style="list-style-type: none"> Direct fabrication using photo-lithography R_{xx} \propto sign and density of charge carriers Magneto-transport: how resistance changes with field and temperature Confirms magnetic transition data <p>$R_H \propto \frac{1}{nq} \frac{dI}{dx}$</p> <p>$n_q$ = charge carriers / volume</p>	<p>Results: Hall effect and magnetotransport</p> <p>Hall coefficient temperature dependence</p> <ul style="list-style-type: none"> ~2% difference between measured and expected $\frac{R_H}{R_{xx}}$ R_H nearly linear below 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 in excimer laser intrinsic LSCO target or external material carried in plasma plume \rightarrow epitaxial LSCO deposited on LaNiO_3 substrate Several films grown from each of three bulk LSCO targets ($x = 0.095, 0.125, 0.155$) Stoichiometry and optical profilometry, 60–150 nm film thickness 	<p>Results: Magnetic transitions</p> <p>Average T_c's: 1.8% loss of barium concentration at each target doping</p> <ul style="list-style-type: none"> Brood transitions: inhomogeneity Spawning electron-necessary 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 confirmed 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>Research supported by the National Science Foundation (NSF) Grant DMR-1508464 and the University of Illinois at Urbana-Champaign. We thank the members of the Materials Research Laboratory (MRL) for their support and assistance. We also thank the members of the MRL for their support and assistance. We also thank the members of the MRL for their support and assistance.</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

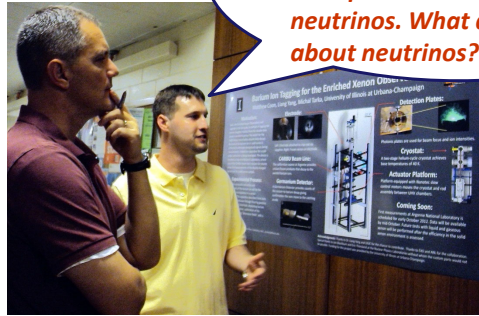
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How do you know which version to give?

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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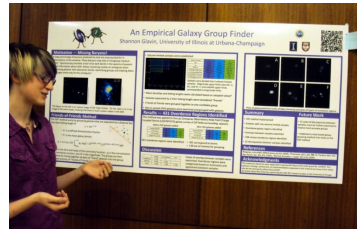
Rules for answering questions:

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, putty, 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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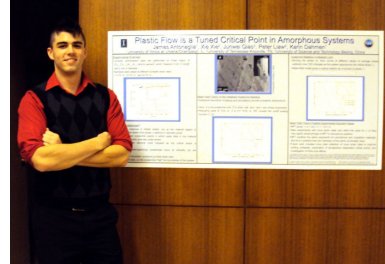
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Convey your enthusiasm for your research project

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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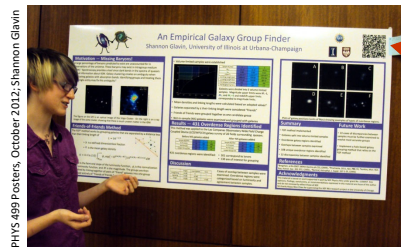
Have hand-outs available

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—
a growling stomach is distracting**

**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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