

Designing and Delivering an Effective Research Talk

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Things to Consider During Design

● ***Length of talk***

- | | |
|--|---------------------------|
| -10 minute APS Meeting talk | intro/conclusion/6 slides |
| -20-30 minute contributed or invited conference talk | 15-20 slides |
| -60 minute seminar (job interview) | 30-40 slides |

Rule of thumb: 2 - 3 minutes per slide

Practice talk: time each slide

- More than this: split slide into multiple slides
- Less than this: drop slide, or combine with another slide

● ***Makeup of audience***

- If you don't understand the material, neither will your audience.
- People generally prefer to hear something they already know than to be blown away by too high of a level.

Rule of Thumb: Aim for a clear and simple presentation. For this class, assume undergraduate level for your audience.

Constructing Your Talk

The best talks are constructed like mystery novels:

- **Introduction:** provides some background to the field, carefully selected to motivate the importance of the problem which will be solved.
- **Methods:** what experimental and theoretical tools are needed to solve the problem? Show explicitly the way in which the required information is derived.
- **Description of the results:** Show data or calculation, discuss how they vary with parameters. Compare to relevant findings of other researchers. Compare to theory or experiment (if available).
- **Discussion of results:** Describe in simple terms what you have learned about the behavior of your system. Have you fully answered the question or are there limitations which would motivate future work?

Rule of Thumb: Spend approximately equal time on each section during your 30 minute talk.

Considerations for Slide Layout

- Discuss only one idea per slide, capsulized in slide title.

Don't use: ``An Effective Slide Layout Uses Bullet Points''

Do Use: ``Effective Slide Layout''

Don't Use: ``Temperature Dependent Resistivity''

Don't Use: ``Variable Range Hopping in Doped NaCl''

Do Use: ``Insulating Behavior in NaCl''

- Present data or argument which support idea using a minimum of graphs.

- Consider a mini-conclusion for each slide which relates to title, and provides a connection to the next slide:

Don't Use: Electrical resistivity of NaCl is 20 MOhm-cm

Do Use: Resistivity of NaCl limited by impurities, but can it be enhanced further?




Aim for a Consistent Look for each Slide

Choose a color

Choose a color

Choose a color

Choose a color

-  Use a marker for important points
-  Use a marker for important point
-  Don't be cute!

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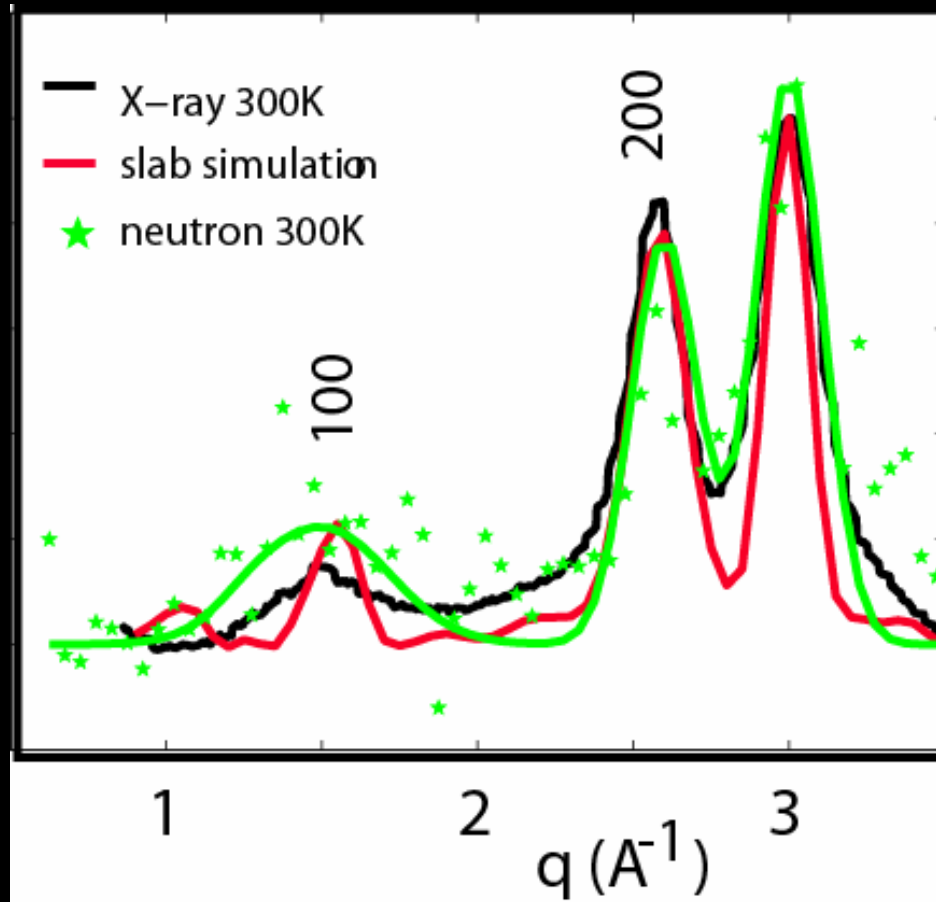
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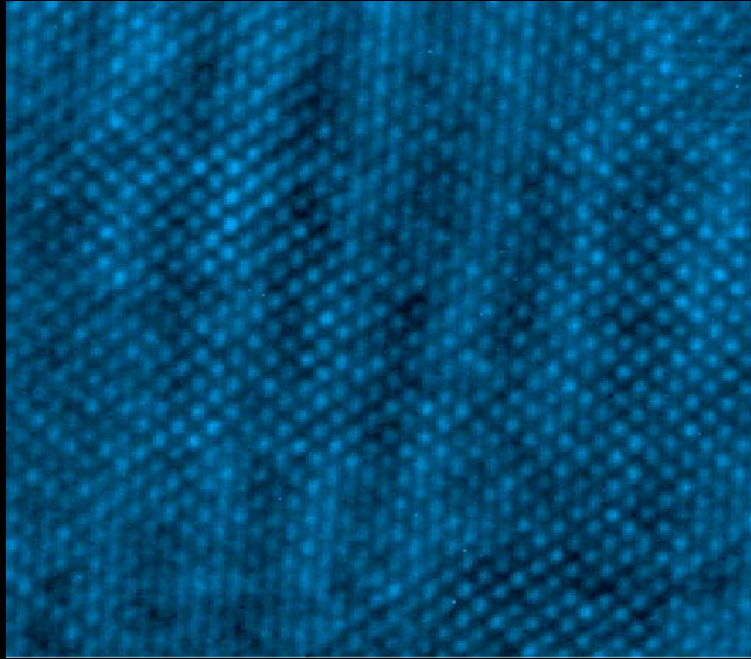
Choose a color

- Use a marker for important points
- ★ Use a marker for important point
- 😊 Don't be cute!

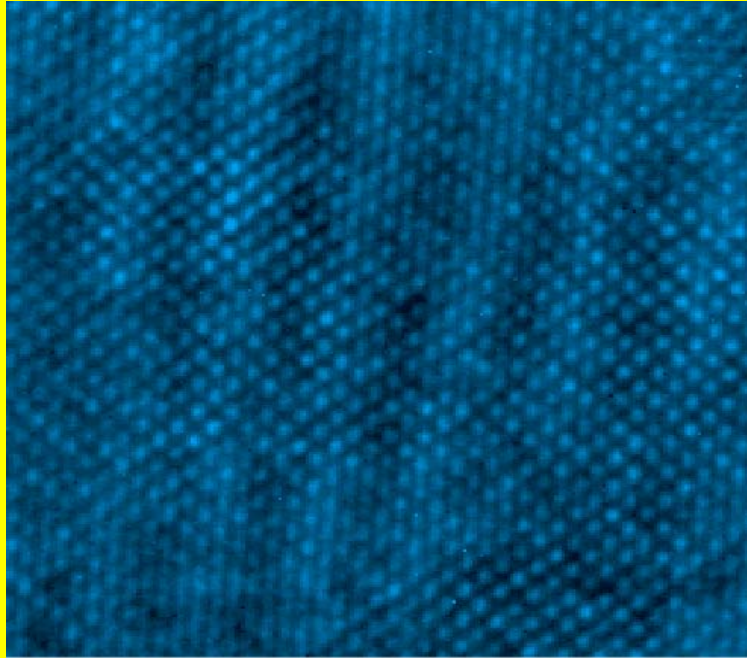
(Usually) avoid fancy features of Powerpoint –
Keep the focus on the research!



Some people like a dark background, but it reduces the amount of light in the room.

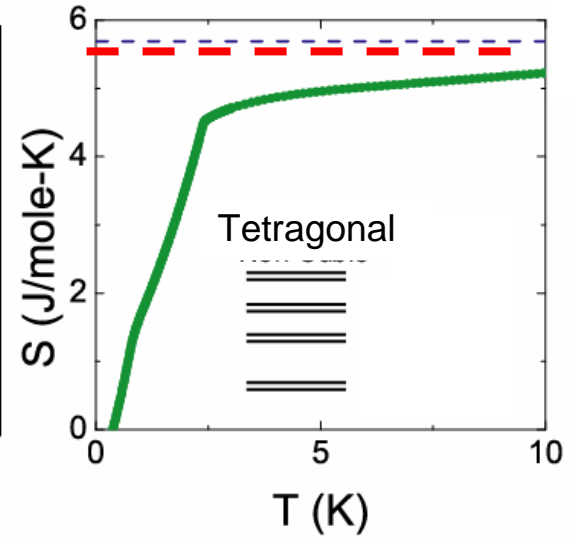
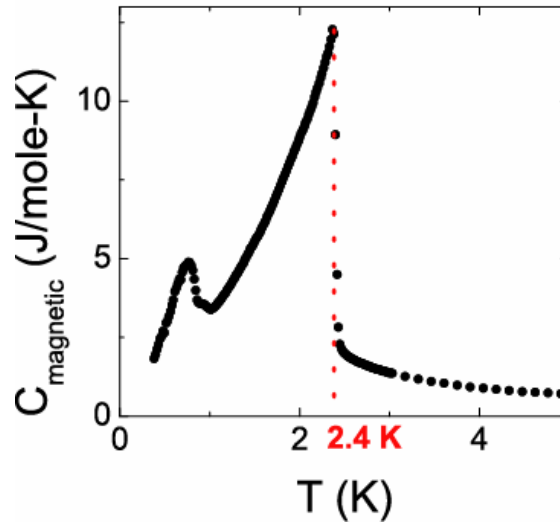
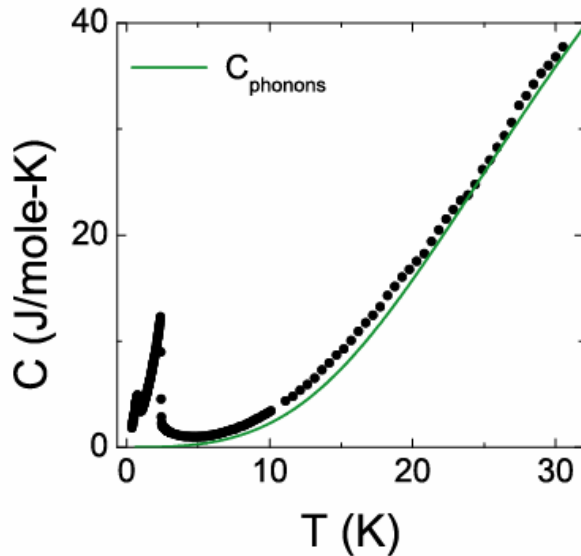


Dark background may not provide enough contrast if your images are dark.



Avoid weird colors

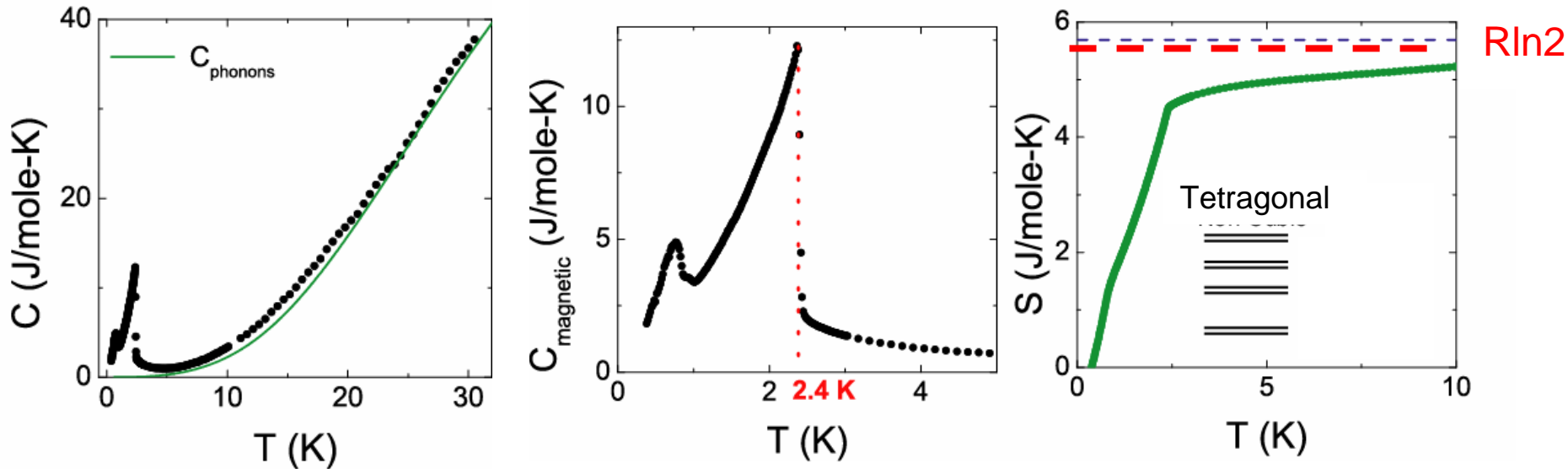
Not too many graphs per page



RIn2

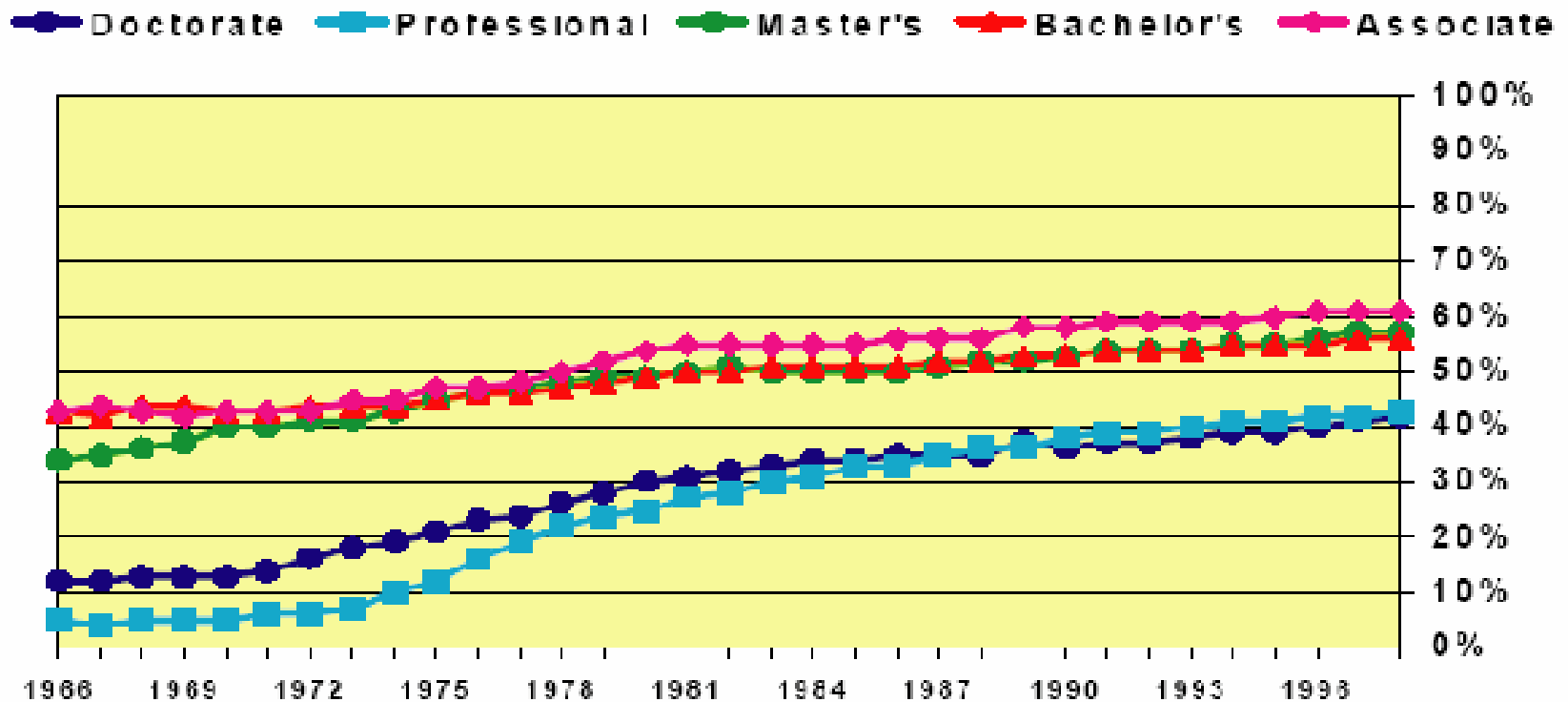
- Phonon contribution from Debye expression, $\Theta_D \sim 250$ K
- Large mean field anomaly at 2.4 K in $C_{\text{magnetic}} = C - C_{\text{phonon}}$
secondary λ -like transition at 0.8 K
- Entropy difference indicates ordering of well-isolated doublet ground state for Yb^{3+}

Keep explanatory text to a minimum



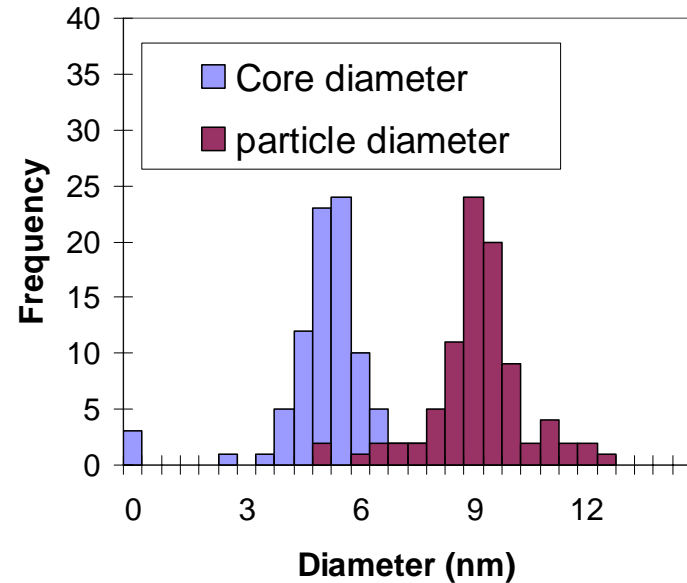
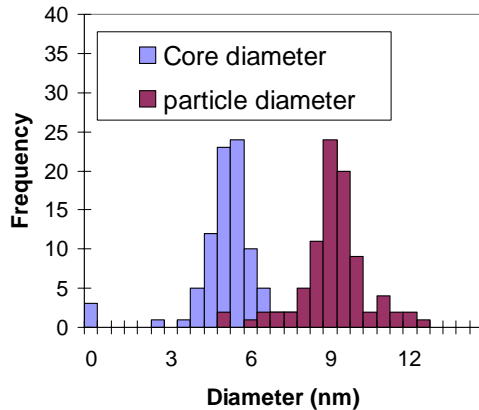
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Consider Having No explanatory text at all !

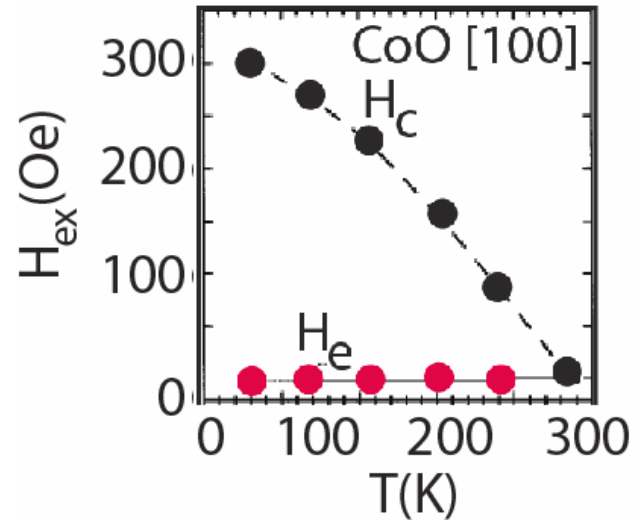
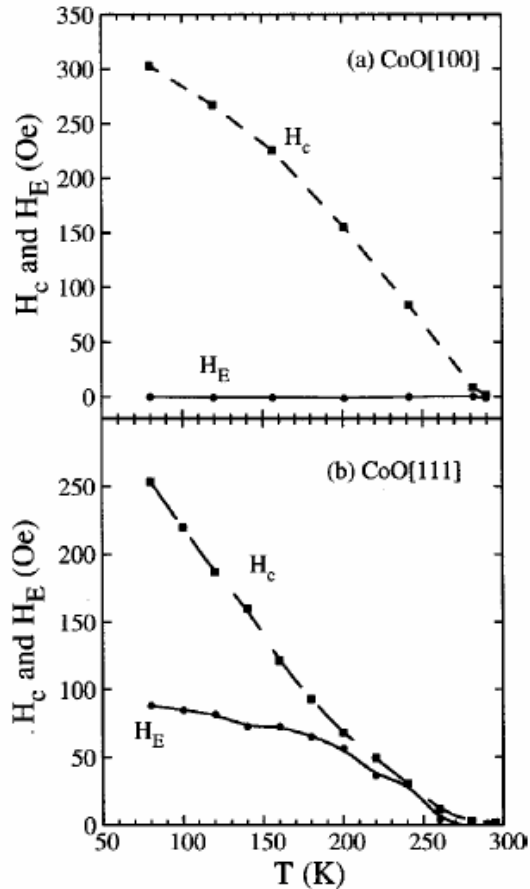


Mason and Goulden 2002; National Center for Education Statistics

Suggestions for High Impact Graphs



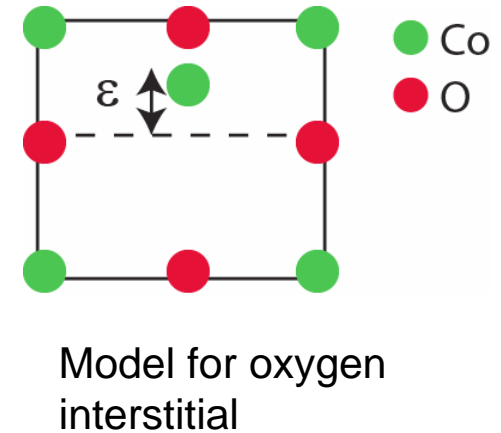
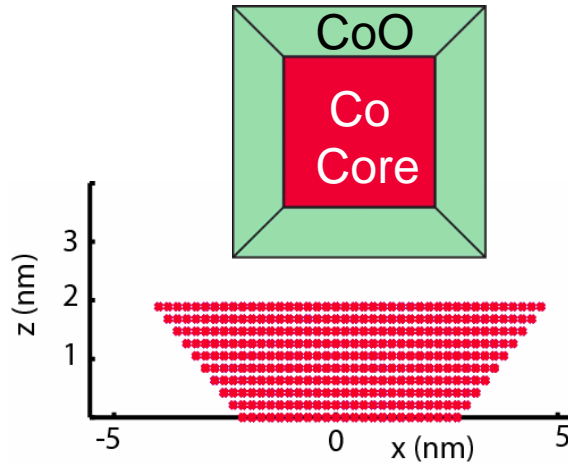
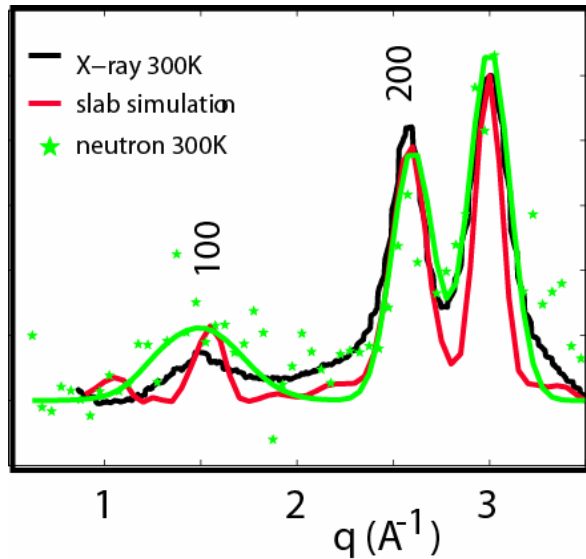
- Size figures so that axis labels are clear, data points can be distinguished.
- Use 18-20 point font for text.
- Use 24-28 point font for accent text (Titles, section headers, conclusions)



Oriented Co/CoO films (Gokemeijer 2001)

PDF snaps of data from journal are seldom suitable, as is.

Not too much info per slide!



$$I_N(q) = I_o N f^2(q) \left[1 + D/N \sum_{nm} \frac{\sin(qr_{nm})}{qr_{nm}} \right]$$

- (100) Tetragonal distortion: 10^3 larger than in bulk CoO (Tomiyasu 2004)
- associated with oxygen interstitials or Co vacancies
- $T > T_N$: strained interface layer $V_{int} < V_{CoO}$ (values of V_{int} and ϵ for each sample)

Heavy
 $\epsilon = 0.2a$



Medium
 $\epsilon = 0.15 a$

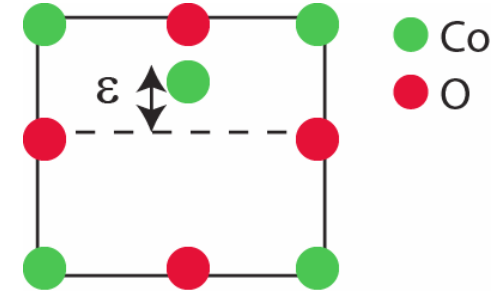
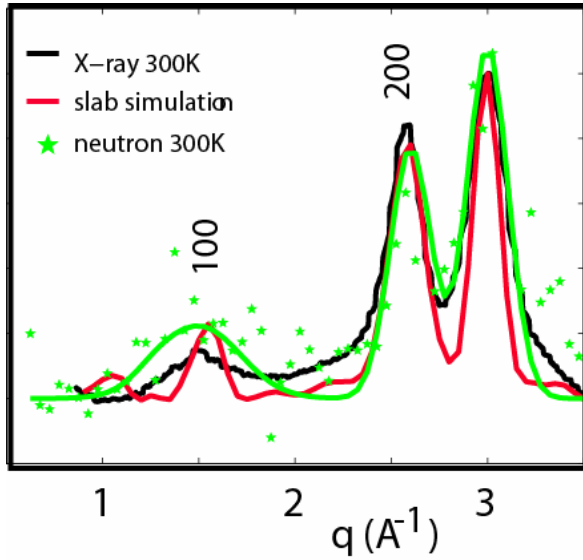


Light
 $\epsilon = 0.08 a$

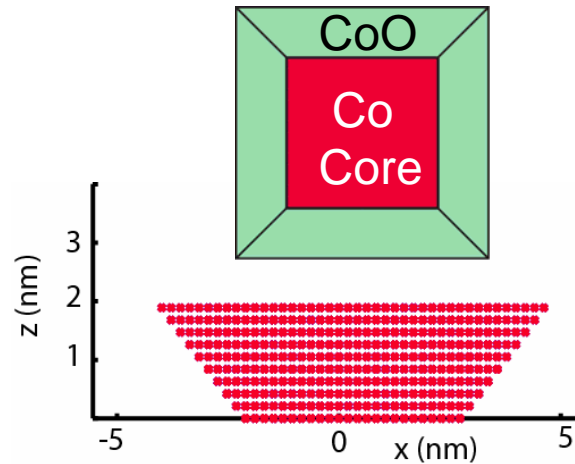


■ core
 ■ interface
 ■ shell

Oxygen Interstitials at Co/CoO Interface



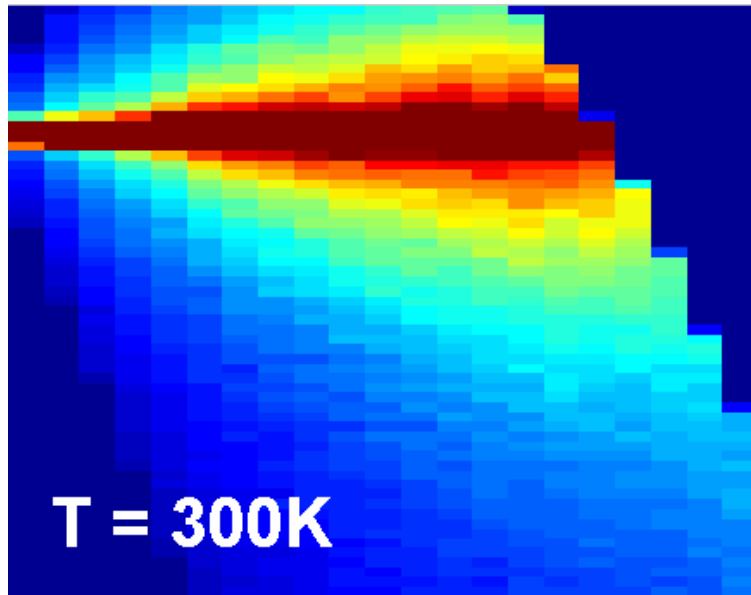
Model for oxygen interstitial



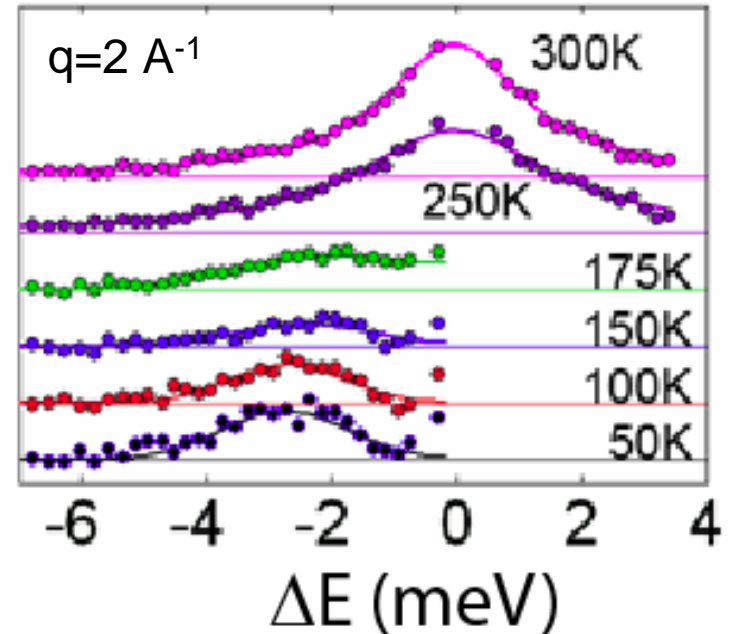
$$I_N(q) = I_o N f^2(q) \left[1 + \frac{D}{N} \sum_{nm} \frac{\sin(qr_{nm})}{qr_{nm}} \right]$$

Magnetic Dynamics

Energy Transfer ΔE (meV)

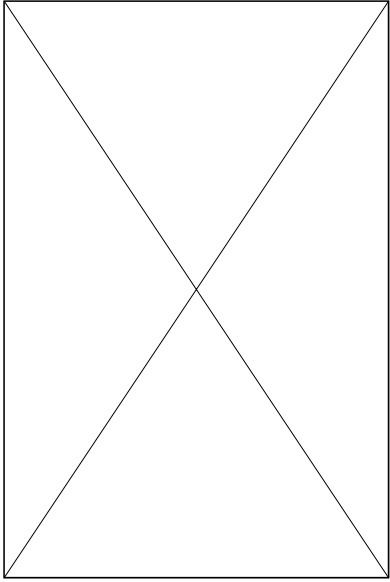


Wave vector q (\AA^{-1})



- Make sure control variable is clearly marked in sequence.
- Follow up with related quantitative analysis.
- BEWARE OF TECHNICAL SNAFUS!

Core-Interface Coupling: $T > T_N$

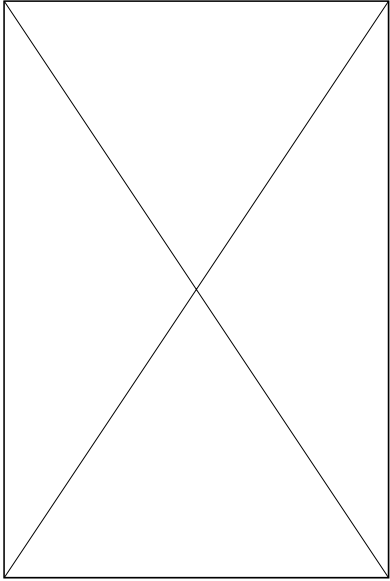


$$T > T_N$$

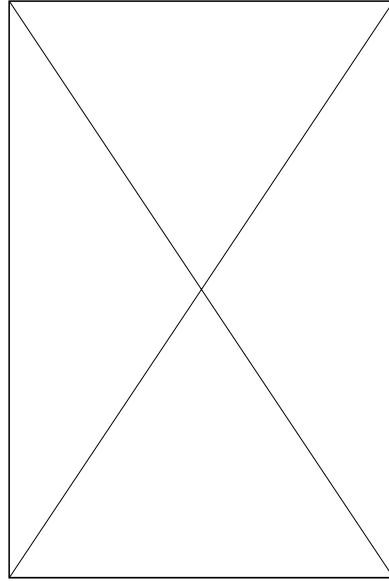
no interface moment
core fluctuates: $E_B = KV$

Animations can be useful but keep them simple and be sure to explain carefully

Core-Interface Coupling: $T \sim T_N$



$T > T_N$



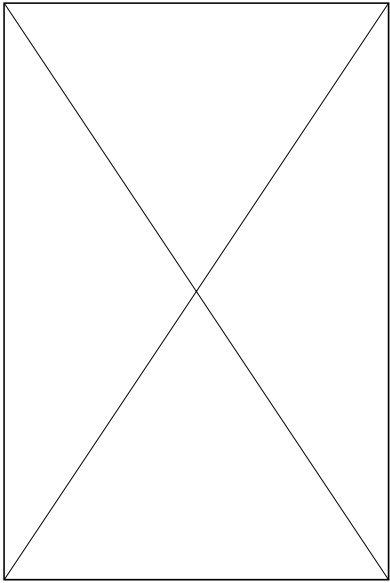
$T = T_N$

Interface moment forms, begins to fluctuate

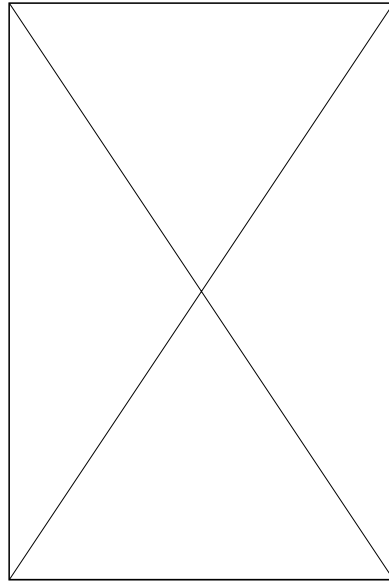
Core reorients, $E_B = KV + E_{ex}$ increases

Core begins to slow down

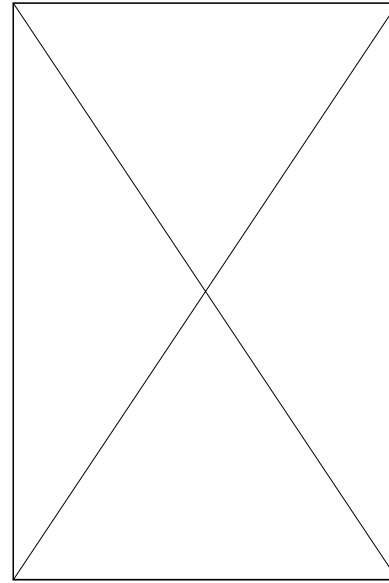
Core-Interface Coupling: $T_{ex} < T < T_N$



$$T > T_N$$



$$T = T_N$$



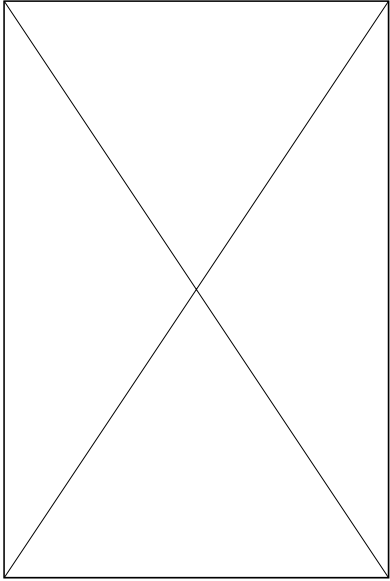
$$T_{ex} < T < T_N$$

Interface moment increases
enhanced coupling to core

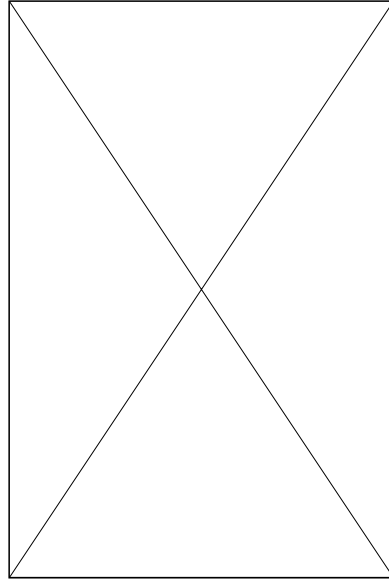
interface speeds up

Core slows down: $E_B = KV + E_{ex}$

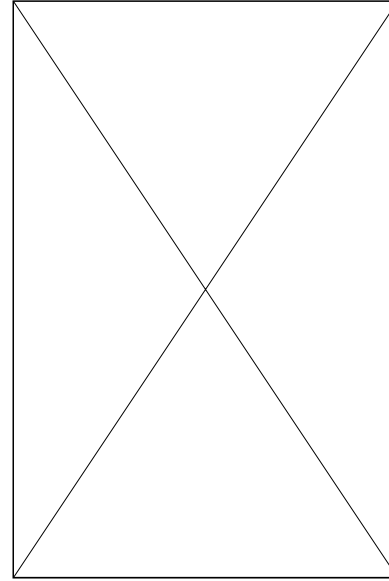
Core-Interface Coupling: $T \rightarrow T_{ex}$



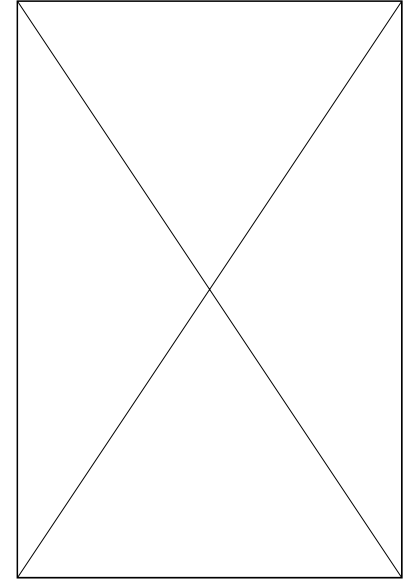
$$T > T_N$$



$$T = T_N$$



$$T_{ex} < T < T_N$$



$$T \sim T_{ex} = 190 \text{ K}$$

Core and Interface
lock together

Delivering a Successful Talk

Know exactly what you are going to say. It is a good idea to memorize your talk

- Your delivery will be smooth and well paced
- You will know how long your talk is, so no going over or ending early.
- There will be no distracting fumbling for words. You will sound authoritative.
- If you get nervous, knowing what to say will really help.

BUT:

It is off-putting if your talk SOUNDS memorized, so work on making your delivery sound natural.

During Your Talk

- ***Be in charge of your equipment.***

Know before you start where you will stand, how to change slides

- ***Keep the focus on the science.***

Hold still! Don't pace while you speak. Limit arm motions.

Avoid quirky mannerisms (your friends can tell you)

Don't dress obtrusively.

Keep your language formal, avoid jokes or colloquial terms.

- ***Use pointer accurately and sparingly.***

- ***Develop rapport with your audience.***

Don't face the screen. As much as possible, face the audience.

Make eye contact with audience members.

Smile! Keep your voice animated.

Pause occasionally for audience to ask questions.