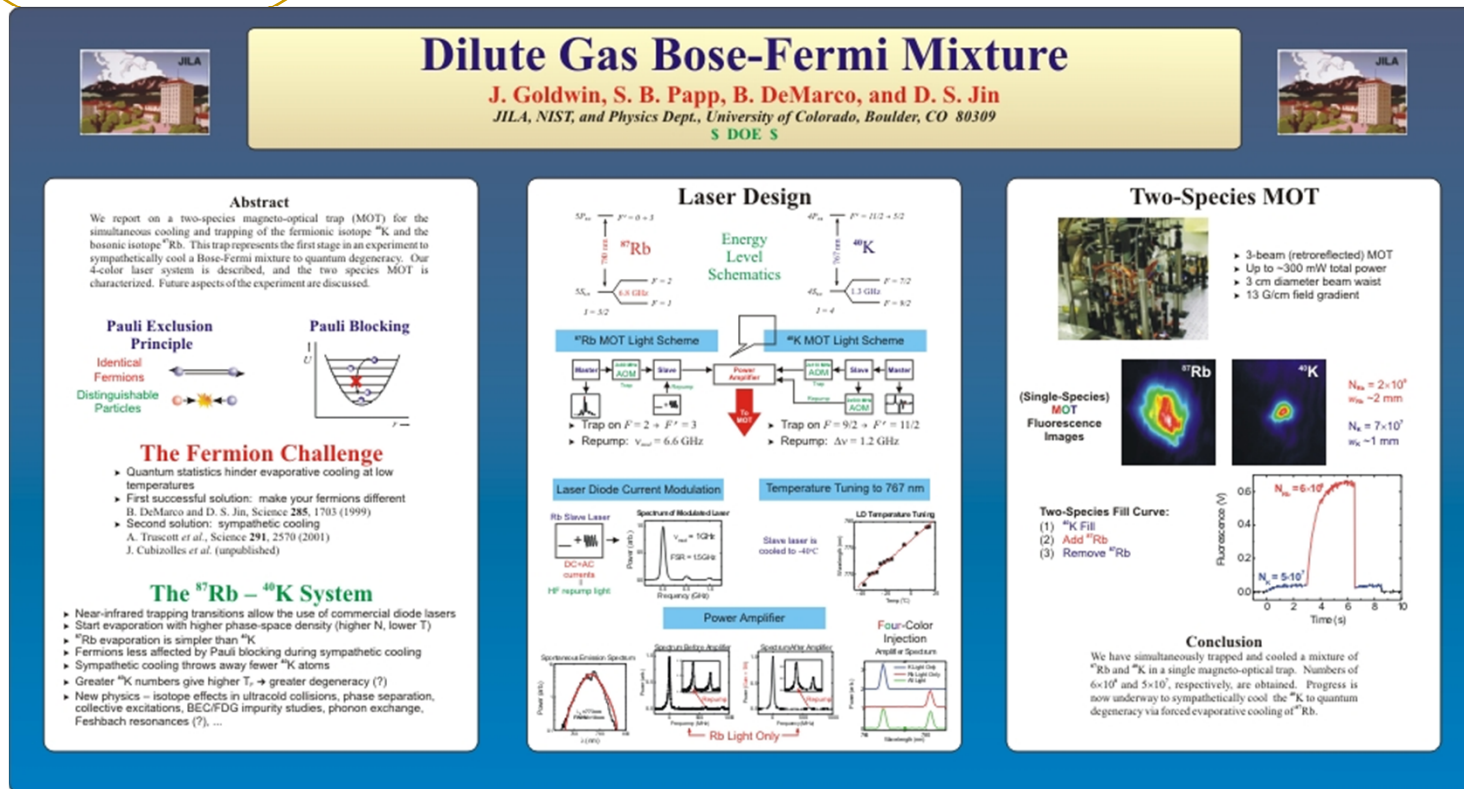


# Tips for Making Scientific Posters



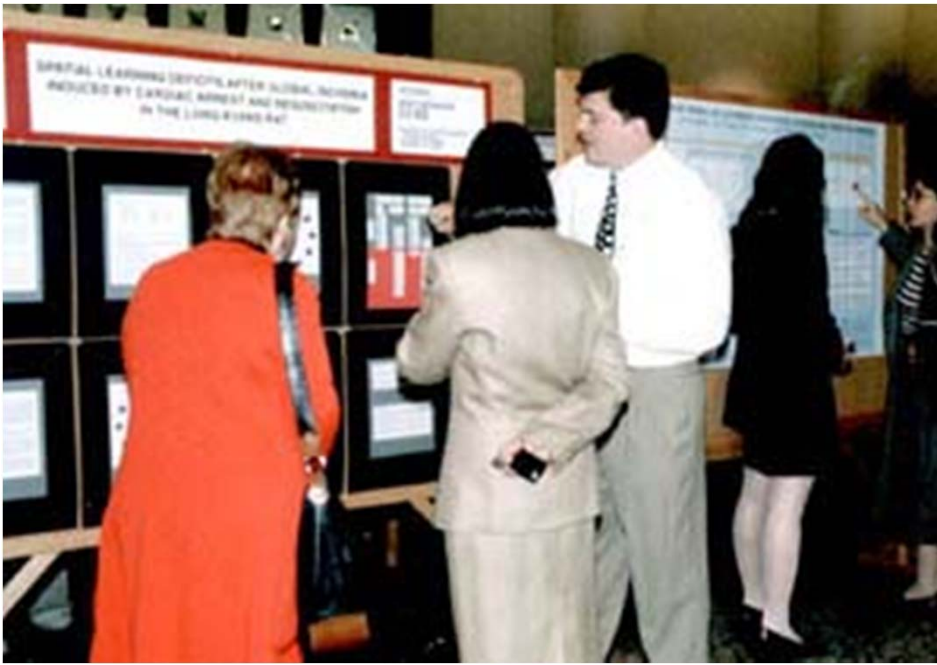
Courtesy B. DeMarco

Source: The Craft of Scientific Presentations, Michael Alley

See also <http://www.writing.eng.vt.edu/posters.html>

# Why a scientific poster?

One of the most common methods of disseminating scientific information at conferences!



Allows one to convey more details than in a talk

Provides an opportunity for more Q&A exchange between author and reader than a talk or paper

# Key features of a poster

Key features of a scientific poster:

Must attract an audience:

Prominent title

Attractive figures (lots)

Clean, open layout

Must quickly orient the reader to the key points

Should be logically arranged

Should contain all elements of a good research paper:

Motivation/Background

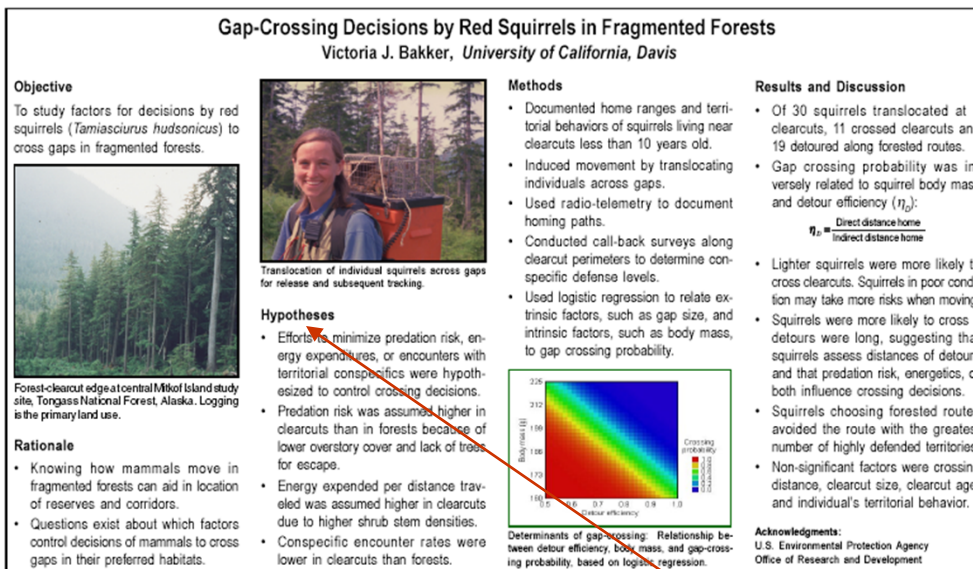
Procedures/Experimental

Results/Analysis

Conclusions

Acknowledgments

Should have clearly labeled sections



Good!

# Key features of a poster

Key features of a scientific poster:

Must attract an audience:

- Prominent title
- Attractive figures (lots)
- Clean, open layout

Must quickly orient the reader to the key points

Should be logically arranged

Should contain all elements of a good research paper:

- Motivation/Background
- Procedures/Experimental
- Results/Analysis
- Conclusions
- Acknowledgments

Should have clearly labeled sections

## Cooling Effects of Dirt Purge Holes on the Tips of Gas Turbine Blades

Eric Couch, Jesse Christophel, Erik Hohlfeld, and Karen Thole

**Gas turbine engines run better at higher combustion temperatures**

At higher combustion temperatures, these engines generate more power and use less fuel. However, these temperatures are restricted by melting temperatures of the turbine blades downstream of the combustor (see Figure 1).

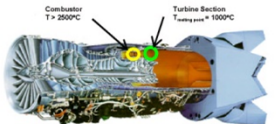


Figure 1. Pratt & Whitney F119 gas turbine engine.

**Dirt purge holes on turbine blade tips allow for higher combustion temperatures**

Harmful hot gases from the combustor leak across the gap between the blade tip and the shroud (see Figure 2). Dirt purge holes expel foreign particles from the blade tip so that film cooling holes are not blocked.

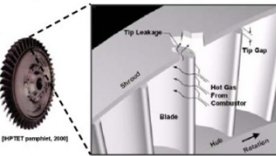


Figure 2. Flow at the tip region of a turbine blade.

**The project goal was to find the film cooling effects of these dirt purge holes**

To find the effects, we performed wind tunnel experiments with scaled turbine blades

The wind tunnel was low speed and low temperature, and the blades, shown in Figure 3, were scaled at 12 times their normal size. To measure temperatures on the blade tip, we used an infrared camera. Tip gap sizes and amount of coolant flow from the dirt purge holes were both varied.

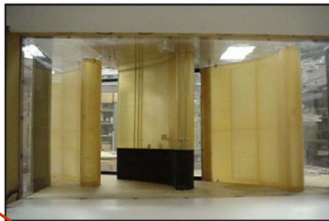


Figure 3. Large-scale turbine blade in wind tunnel.

**Temperature measurements were converted to dimensionless cooling effectiveness**

$$\text{Effectiveness } \eta = \frac{T_{\text{tip}} - T_{\text{tip,0}}}{T_{\text{tip,0}} - T_{\text{C}}}$$

where  $T_{\text{tip}}$  = midspan temperature,  $T_{\text{tip,0}}$  = inlet temperature,  $T_{\text{C}}$  = adiabatic wall temperature (on tip surface)

**Cooling increased with blowing ratio**

The effectiveness contours of Figure 4 show that cooling increased with blowing ratio.

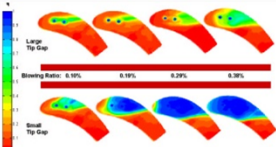


Figure 4. Measurements of film cooling effectiveness.

**Tip size dramatically affected cooling**

In Figure 5, the lateral averages of effectiveness plotted against the axial chord length show that tip size dramatically affected the cooling.

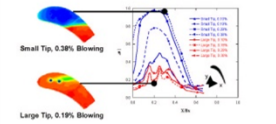


Figure 5. Laterally averaged effectiveness plotted against normalized axial chord.

**In summary, dirt purge holes provide cooling to the tip surface**

While intended to remove dirt from the blade, dirt purge holes also provide cooling to the tip surface. This cooling is enhanced with a small tip gap as the dirt purge floods the tip region near the leading edge with cool air.

**Acknowledgments**

The sponsor for this project was Pratt & Whitney.

Not so good!

# Posters should have more description than a talk slide, less description than a paper

Too little description:

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



Professor K. A. Thole  
Virginia Tech Experimental and Computational Convection Laboratory



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

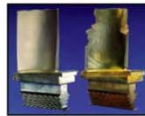


Jet engines

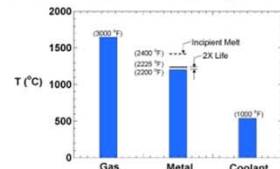


Power turbines

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

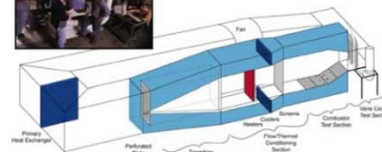


Better cooling schemes can dramatically affect the life of blades and vanes in gas turbines



If a cooling scheme can decrease the temperatures that a blade experiences by 25°C, the blade's life will double

Our laboratory studies cooling schemes through experiments and computations

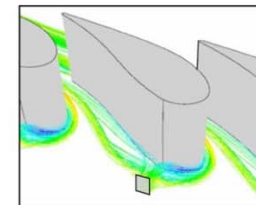


Wind Tunnel Experiments

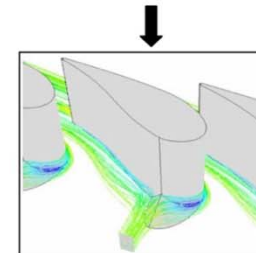


Computational Predictions

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



Without Fillet: Unwanted Vortices

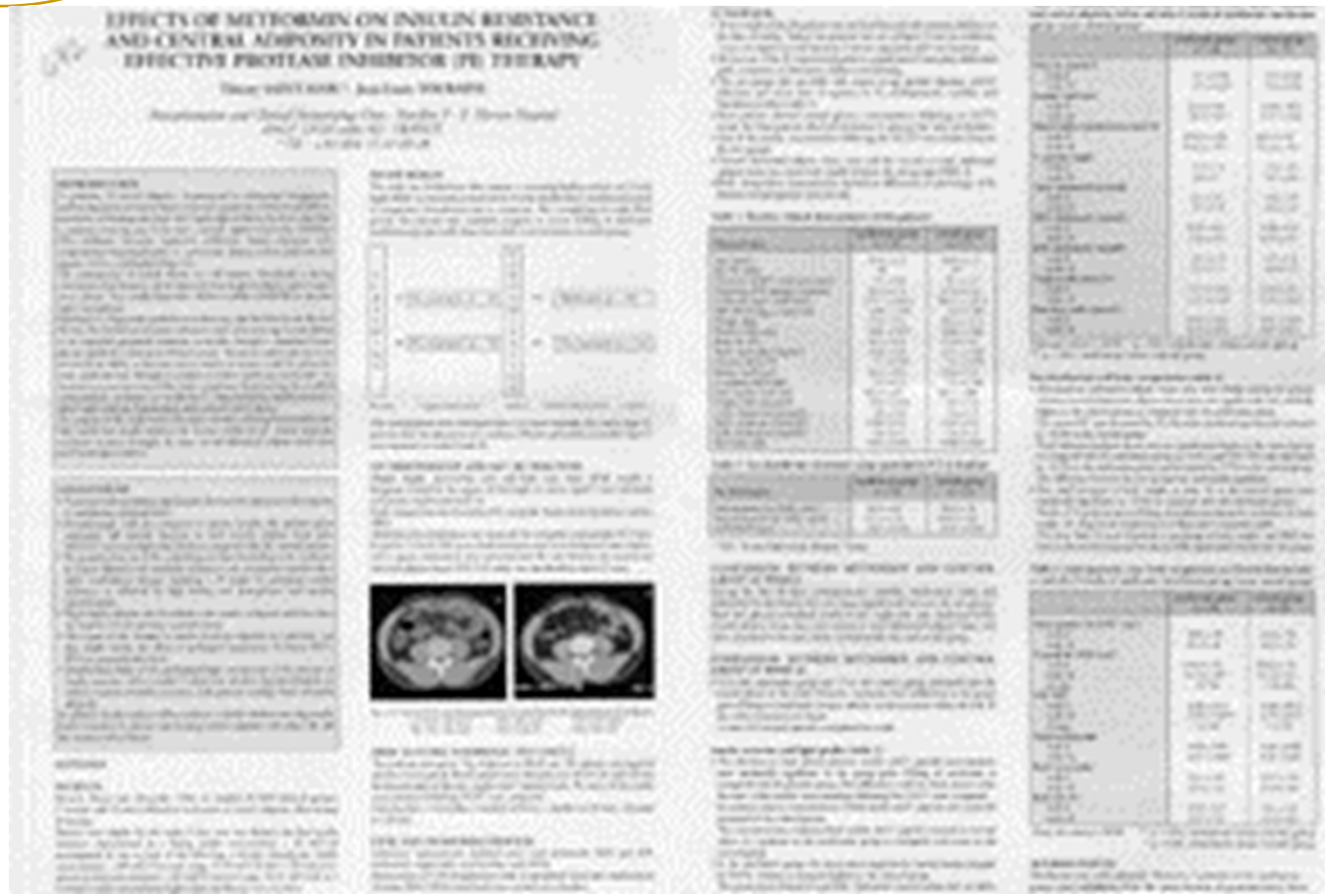


With Fillet: Vortices Reduced

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

Posters should have more description than a talk slide, less description than a paper

(Way) too much description:



# How to get started:

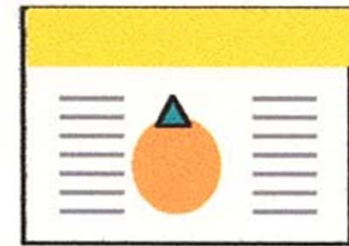
## Choose a poster layout



vertical columns



contrasting fields



centered images w/ explanations

### Robust Repair of Polygonal Models

Shaojun Chen, Department of Computer Science, Rice University, Houston, TX

**Polygonal Models**

- Represented as a set of triangles or polygons.
- Used in many applications: CAD, animation, etc.
- Common operations: translation, rotation, scaling, etc.
- Deformation: bending, stretching, etc.
- Boolean operations: union, intersection, etc.
- Mesh repair: filling holes, etc.

**Closed Models**

- The boundary of a closed model is a closed curve.
- The boundary of a closed model is a closed curve.
- The boundary of a closed model is a closed curve.

**Model Repair**

- Repair holes in a polygonal model.
- Repair holes in a polygonal model.
- Repair holes in a polygonal model.

**Volumetric Approach**

- Scan conversion**
  - Convert a polygonal model to a volumetric model.
  - Convert a polygonal model to a volumetric model.
- Sign generation**
  - Generate a sign for each voxel.
  - Generate a sign for each voxel.
- Contouring**
  - Extract contours from the volumetric model.
  - Extract contours from the volumetric model.

**3D Illustration**

Scan conversion → Sign generation → Contouring

**Examples**

1. Repairing gaps in polygonal models (e.g., holes, cracks, etc.)

2. Repairing closed models (e.g., spheres, cubes, etc.)

**Highlights**

- Robust**: Does not require any input.
- Efficient**: Fast and accurate.
- Accurate**: High precision.

**Acknowledgements**

This work is supported by the National Science Foundation (NSF) Grant IRI-0325330.

### Recent Advances in Management in Patients on Subcutaneous Therapy

Dr. Michael Zuber, Department of Endocrinology, University of Michigan, Ann Arbor, MI

**Abstract**

Subcutaneous (SC) therapy is a convenient and effective way to deliver insulin. However, SC therapy is associated with several challenges, including pain, lipohypertrophy, and injection site reactions. Recent advances in SC therapy include the development of new insulin analogs, the use of SC sensors, and the development of new SC delivery devices.

**Background/Methods**

The objective of this study was to evaluate the safety and efficacy of a new SC insulin analog. The study was a randomized, controlled trial comparing the new SC insulin analog to a standard SC insulin analog. The primary endpoint was the percentage of patients who were able to achieve target glycemic control.

**Results**

The new SC insulin analog was found to be safe and effective. There was no significant difference in the percentage of patients who were able to achieve target glycemic control between the two groups.

**Conclusions**

The new SC insulin analog is a safe and effective alternative to standard SC insulin analogs.

**References**

1. Zuber M, et al. (2018) Recent Advances in Management in Patients on Subcutaneous Therapy. *Journal of Endocrinology*, 198(2), 1-10.

### Determination of RNA Secondary Structure in the 5' Non-Coding Region of Coxsackievirus B1

Wenli L. Schulz (Dr. Patrick Tam, PhD)  
Department of Medicine, Division of Rheumatology and Autoimmune Diseases, University of Minnesota

**Abstract/Introduction**

Coxsackievirus B1 (CVB1) is a plus-strand RNA virus and a member of the Picornaviridae family. Studies have shown that, unlike most cellular mRNAs, translation initiation of picornavirus RNA is not cap-dependent. Instead, translation is mediated by an internal ribosome entry site (IRES) located in the 5' non-coding region (NCR). The IRES is thought to be a structural element that is essential for translation of CVB1-induced chronic muscle diseases. Investigation of chronic disease mouse models as well as development of chronic disease mouse models have shown that a single mutation of nucleotide 796, which is located in the IRES and near the translation start site (ATG), changes the pathogenic phenotype of the virus to one that causes an acute infection but not chronic disease in our mouse model. We have performed comparative modeling of the NCR secondary structure which has predicted a consistent structural change between the pathogenic virus and the mutated form. This domain is composed of nucleotides 792-800, which is highly conserved in the wild type virus to 38 nucleotides in the mutant. Through a series of structural algorithms and primer extension, we have determined the actual secondary structure of the NCR. Determining how the mutation of nucleotide 796 alters RNA secondary structure is an important step in deciphering the CVB1 mouse chronic inflammatory phenotype.

**Background/Methods**

The sequence of the 5' NCR region is highly variable among picornaviruses. However, secondary structure is generally conserved.

- Structural changes in the NCR may affect ribosome binding and scanning as well as binding of host cell factors involved in translation.
- MP125, isolated by Dr. Michael Zuber, was used to predict the secondary structure of wild-type CVB1 MP125 and a mutant (AMP127) between nucleotides 1 and 742 (the non-coding region).
- Both sequences were folded at linear RNA at 37°C and the most conserved structures were presented to us.
- The structural structure of the MP125 NCR was solved using Primer 17, which consists of 11 of single-stranded DNA, followed by primer extension and GelScan (AM) (2002) analysis.

**MP125 NCR Secondary Structure**

Primer extension results for MP125 and AMP127. The primer extension results show that the secondary structure of the NCR is conserved between the two sequences.

**Primer Extension Results**

The primer extension results show that the secondary structure of the NCR is conserved between the two sequences.

**Conclusions**

The secondary structure of the NCR is conserved between the two sequences.

**References**

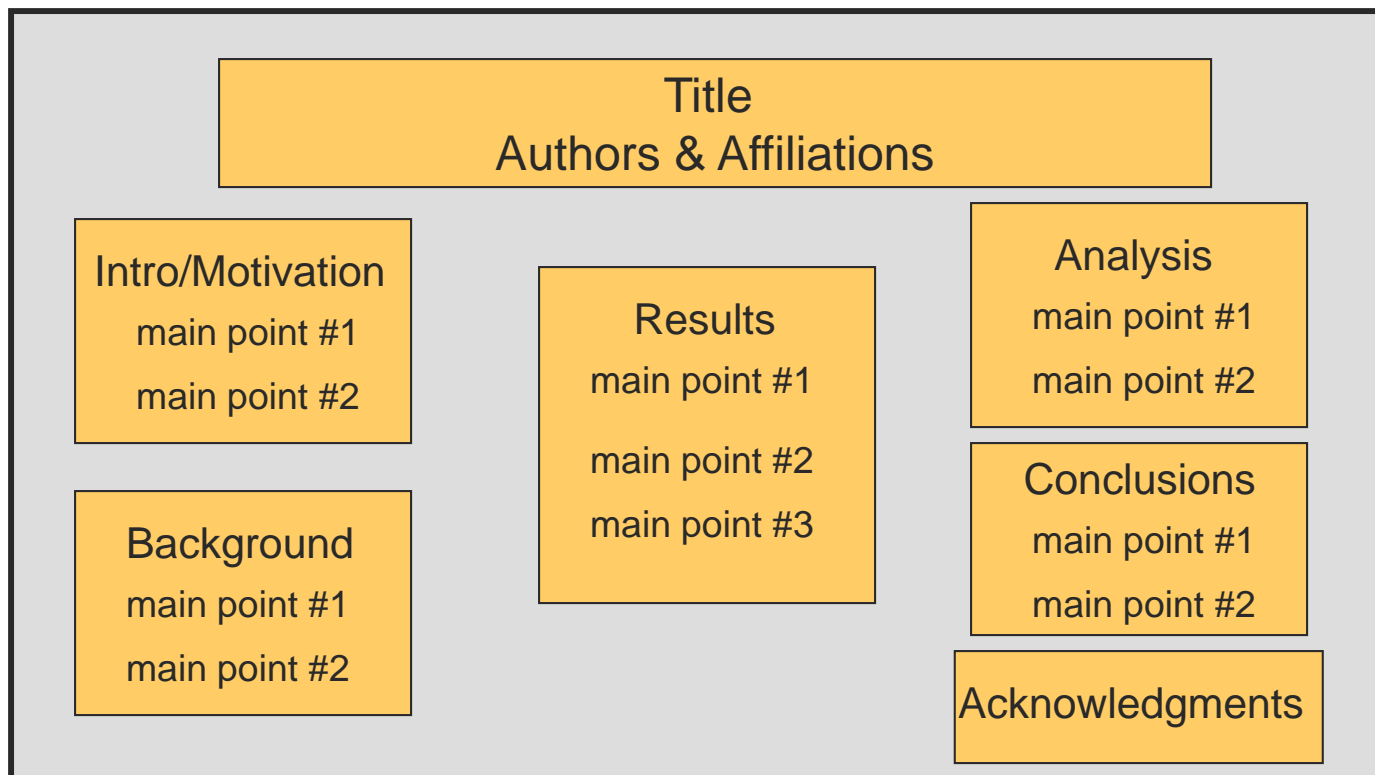
1. Schulz W, et al. (2018) Determination of RNA Secondary Structure in the 5' Non-Coding Region of Coxsackievirus B1. *Journal of Virology*, 92(12), 5858-5865.

# How to get started:

Sketch your organizational plan on paper

Write down the key ideas in each section

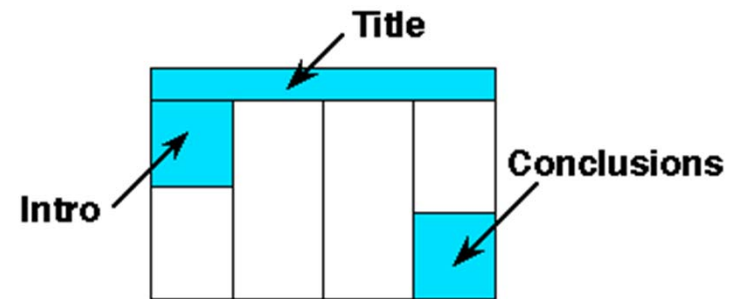
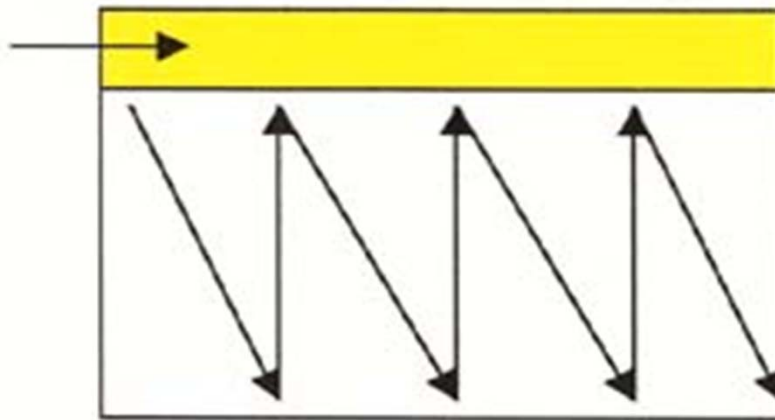
Identify the figures/results that best convey your ideas in each section





# How to get started:


Make sure there's a coherent "flow" in your sections



You're telling a story, so make sure the reader knows where to start and end


# How to get started:

Use lots of blank space around margins to define sections:



## Dilute Gas Bose-Fermi Mixture

J. Goldwin, S. B. Papp, B. DeMarco, and D. S. Jin  
JILA, NIST, and Physics Dept., University of Colorado, Boulder, CO 80309  
S DOE S




### Abstract

We report on a two-species magneto-optical trap (MOT) for the simultaneous cooling and trapping of the fermionic isotope  $^{40}\text{K}$  and the bosonic isotope  $^{87}\text{Rb}$ . This trap represents the first stage in an experiment to sympathetically cool a Bose-Fermi mixture to quantum degeneracy. Our 4-color laser system is described, and the two species MOT is characterized. Future aspects of the experiment are discussed.

**Pauli Exclusion Principle**

Identical Fermions  $\leftrightarrow$  Distinguishable Particles

**Pauli Blocking**



### The Fermion Challenge

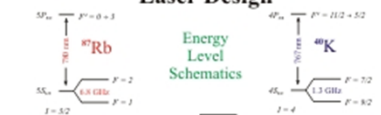
- Quantum statistics hinder evaporative cooling at low temperatures
- First successful solution: make your fermions different (B. DeMarco and D. S. Jin, Science 285, 1703 (1999))
- Second solution: sympathetic cooling (A. Truscott et al., Science 291, 2570 (2001))
- J. Cubizolles et al. (unpublished)

### The $^{87}\text{Rb} - ^{40}\text{K}$ System

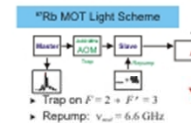
- Near-infrared trapping transitions allow the use of commercial diode lasers
- Start evaporation with higher phase-space density (higher  $N$ , lower  $T$ )
- $^{87}\text{Rb}$  evaporation is simpler than  $^{40}\text{K}$
- Fermions less affected by Pauli blocking during sympathetic cooling
- Sympathetic cooling throws away fewer  $^{40}\text{K}$  atoms
- Greater  $^{40}\text{K}$  numbers give higher  $T$   $\rightarrow$  greater degeneracy (?)
- New physics – isotope effects in ultracold collisions, phase separation, collective excitations, BEC/FG impurity studies, phonon exchange, Feshbach resonances (?), ...

### Laser Design

**Energy Level Schematics**

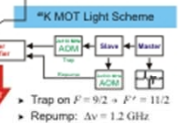


**$^{87}\text{Rb}$  MOT Light Scheme**



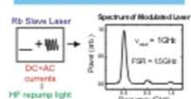
- Trap on  $F=2 \rightarrow F'=3$
- Repump:  $\nu_{\text{repump}} = 6.6 \text{ GHz}$

**$^{40}\text{K}$  MOT Light Scheme**



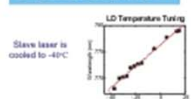
- Trap on  $F=9/2 \rightarrow F'=11/2$
- Repump:  $\Delta\nu = 1.2 \text{ GHz}$

**Laser Diode Current Modulation**

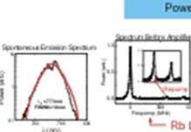


Slave laser is cooled to  $-40^\circ\text{C}$

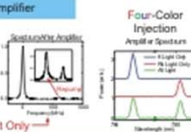
**Temperature Tuning to 767 nm**




**Power Amplifier**



**Four-Color Injection**

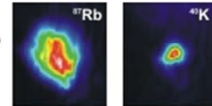


### Two-Species MOT



- 3-beam (retroreflected) MOT
- Up to  $\sim 300 \text{ mW}$  total power
- 3 cm diameter beam waist
- 13 G/cm field gradient

**(Single-Species) MOT Fluorescence Images**

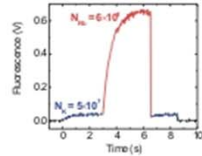


$N_{^{87}\text{Rb}} = 2 \times 10^7$   
 $w_{^{87}\text{Rb}} \sim 2 \text{ mm}$

$N_{^{40}\text{K}} = 7 \times 10^7$   
 $w_{^{40}\text{K}} \sim 1 \text{ mm}$

**Two-Species Fill Curve:**

- $^{40}\text{K}$  Fill
- Add  $^{87}\text{Rb}$
- Remove  $^{87}\text{Rb}$



$N_{^{87}\text{Rb}} = 6 \cdot 10^7$   
 $N_{^{40}\text{K}} = 5 \cdot 10^7$

### Conclusion

We have simultaneously trapped and cooled a mixture of  $^{87}\text{Rb}$  and  $^{40}\text{K}$  in a single magneto-optical trap. Numbers of  $6 \times 10^7$  and  $5 \times 10^7$ , respectively, are obtained. Progress is now underway to sympathetically cool the  $^{40}\text{K}$  to quantum degeneracy via forced evaporative cooling of  $^{87}\text{Rb}$ .

Courtesy B. DeMarco

# How to get started:

## Setting up PowerPoint:

Select "Page Setup" under File Menu →

Slides sized for: Custom

Orientation of slides: Landscape

Width of slides: 56 inches

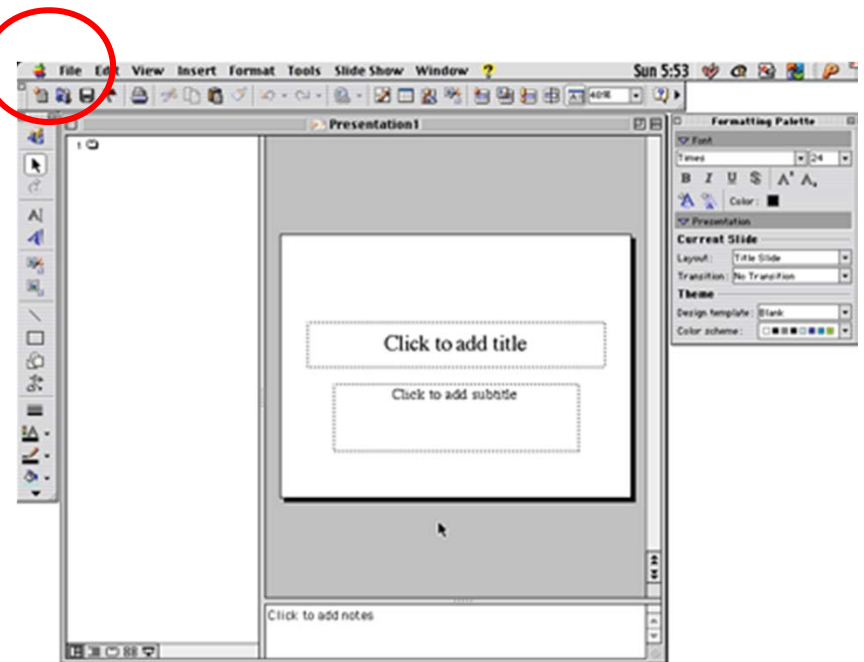
Height of slides: 28 inches

Title: 90-120 pt, sans serif font

Author: 48-60 pt. sans serif

Headings: 70-80 pt. sans serif

Main text: 36-40 pt. sans serif



## Other tips: Text

Text and figures should be legible from 3-5 feet away: 36 pt. font size minimum!

Edit excessive text!! Poster should have roughly 20% text, 40% figures, 40% space

Use sans serif fonts: these fonts are more legible than serif fonts from a distance

Headings and other text having the same level of importance should be the same font size

Generally, putting information in “bullet” form, rather than in sentences, is better:

### Original

The ideal anesthetic should quickly make the patient unconscious but allow a quick return to consciousness, have few side effects, and be safe to handle.

### Revised

#### **Ideal anesthetics should:**

- offer quick sedation
- provide quick recovery
- have few side effects
- be safe to handle



## Other tips: Color

Use color to define relationships between different areas of the poster

Use color to create coherence and guide the reader through your poster

DON'T overuse color...too much variation will distract from the substance of your poster

DON'T use color arbitrarily – the reader expects color to *mean something*, so they'll be confused if it's arbitrarily applied

DON'T use a distracting background, and make sure there's sufficient contrast between the background and the text

Beware shading of backgrounds...this sometimes doesn't show up well when enlarged to full poster size

## Other tips: Figures

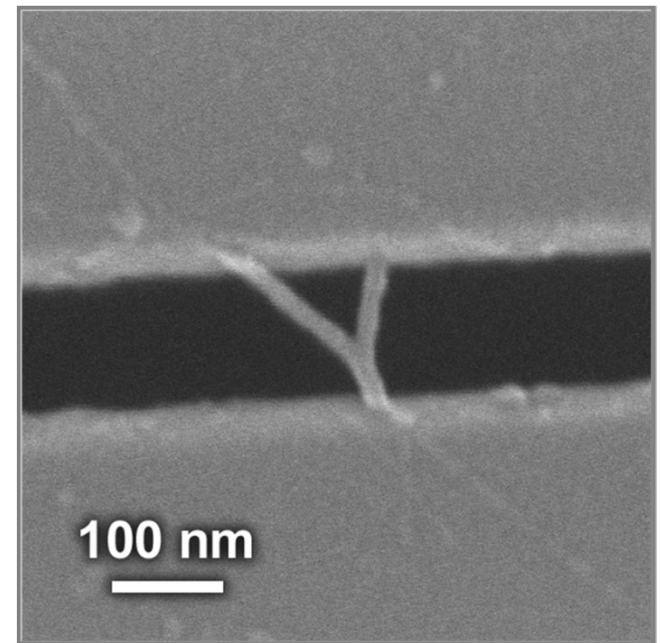
Make sure to label all figures with legible fonts and font sizes

Include a brief caption for the figure, or explicitly refer to the figure in the text

Make sure your images and figures are of sufficiently high resolution to be enlarged

Make sure your figures advance the points you're making in the text

Use darker background for lighter figures/pictures, and a lighter background for darker figures/pictures


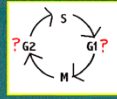


# Critique these posters:

**What makes your CELLS tick?**

**Coordination of cell proliferation and cell-type specification in vertebrate embryos: the role of dynamic regulation of the cdc25 phosphatases.**

*Mercedes Barrutia, Damian Nogare, Mary Ellen Lane, Ph.D.*

**ABSTRACT**

The generation of a multicellular embryo from a single-celled zygote requires coordinating cell proliferation with mechanisms that regulate cell-type specification and cell movement. It is therefore essential that the rate of cell proliferation is variable for different populations of embryonic cells and different developmental stages. Following early, rapid, synchronous cell divisions, dynamic spatiotemporal regulation of cell proliferation is observed. We are interested in the molecular mechanisms that produce this spatiotemporal control in the embryo of a vertebrate, the zebrafish *Danio rerio*. Due to its rapid development, large transparent embryos, and genetic tractability, zebrafish is the ideal vertebrate model for these studies. In all eukaryotic organisms, the cdc25 tyrosine phosphatase plays a major role in cell cycle progression via activation of Mitosis Promoting Factor (MPF). Most higher metazoan genomes contain more than one gene encoding cdc25 phosphatases. To determine whether dynamic transcription of cdc25 is an important mechanism for spatiotemporal control of cell proliferation, as is the case in the *Drosophila* embryos, we are isolating the zebrafish genes encoding cdc25 by PCR. We have identified the zebrafish cdc25A gene and examined its spatiotemporal expression in developing embryos by *in situ* hybridization. Expression of cdc25A is observed in only a subset of proliferating cells of the developing nervous system and mesoderm. In some of these cells, namely the precursors of primary motor neurons (PMN) and retinal ganglion cell (RGC), expression appears to be restricted to the terminal mitosis. Future work will focus on analyzing the coordination of cdc25A transcription with the mechanisms that control differentiation of these cells, and on isolation and expression analysis of additional cdc25 genes.

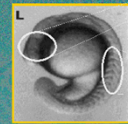
**METHODS:**

to isolate cdc25, I made primer pairs from an expressed sequence tag (EST), which is homologous to cdc25. Then I was able to clone Cdc25 from cDNA library (of zebrafish) through PCR reaction and expression vectors. After isolation, I determined when and where the gene is expressed through *in-situ* hybridization.

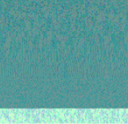
**INTRODUCTION**

With knowledge of the cell cycle and its regulators in other experimented organisms, we may be able to discern how certain aspects of processes, morphogenesis and pattern formation, are regulated at a molecular level in the zebrafish. In early embryonic cells, the cell cycle is synchronous and consists of two phases: mitosis (M) and synthesis (S). A two-subunit phosphoprotein of Cdk and cyclin, known as Mitosis Promoting Factor (MPF), is responsible for the entry to Mitosis. At later stages, the cell cycle experiences a transition (mid-blastula stage) from maternal mRNA control to zygotic mRNA control, synchronous to asynchronous cell division, and entrance of G1 and G2 phase. According to research on *Drosophila* flies, the MPF for the progression through G2 phase is activated through steps of phosphorylation/dephosphorylation on the Cdk subunit: (1) phosphorylation at residues Threonine-161, Tyrosine-15, and Threonine-14 by a particular set of enzymes, and (2) dephosphorylation of Thr 14 and Tyr 15 by an Cdc25 enzyme (called *string*) (Voet & Voet, 1995). Identifying Cdc25 in zebrafish will allow us to understand the cell-to-cell interaction occurring at the cell cycle for most higher metazoan genomes.

**RESULTS**



**Figure 1: Expression of the CDC25 in the Retinal Ganglion Cells at the Terminal Mitosis Stage.**



**Figure 2: Expression of the CDC25 in the Primary Motor Neurons at the Terminal Mitosis Stage.**

**Selected Sources:**

Gilbert, S. F. (1997). *Developmental Biology* (5th ed.). Sunderland: Sinauer Associates.  
 Kimmel et al. (1995). *Developmental Dynamics* 103:253-310. New York: Wiley & Sons. <http://zfin.org>  
 Lehner, C., and Lane, M.E. (1997) *Journal of Cell Science* 110, 523-528. Great Britain: The Company of Biologists Limited.  
 Voet, D., & Voet, J. G. (1995). *Biochemistry* (2nd ed.). New York: John Wiley & Sons.

Please feel free to contact [alegria@rice.edu](mailto:alegria@rice.edu)

# Critique these posters:

## Robust Repair of Polygonal Models

Tao Ju (jutao@rice.edu), Department of Computer Science, Rice University, Houston, TX

### Polygonal Models



Figure 1. The statue of David by Michelangelo in the Galleria dell'Accademia in Florence (left), and the polygonal model reconstructed from laser range scans (right).

Polygonal models are most popular for representing 3D objects in computers. They are created from:

- 3D laser range scans (e.g., Michelangelo's David, the Bunny, the Dragon)
- Computer-aided design softwares (e.g., Maya, Autocad, 3DMax, Lightwave)
- Other representations (e.g., industrial CAD models, medical MRI data, geological data)

Polygonal models have wide applications:

- Industrial design and manufacturing
- Medical visualization and analysis
- Scientific computation and simulation
- Games, animated movies, movie CG, ...

### Closed Models

Many applications (e.g., rapid prototyping) require a closed model with well-defined inside and outside:

- The model partitions the space into distinct external and internal volumes
- Each polygon face lies on the boundary between an external volume and an internal volume



Figure 2. A closed polygonal model of the Utah teapot (left) and the resulting plastic teapot created by rapid prototyping (right).

### Model Repair

Goal: given an arbitrary polygonal model, generate a closed model that approximates the original geometry

Why so hard?

- Today's polygonal models are often gigantic - over millions of triangles
- Errors in models can be very complex:
  - gaps and complex holes
  - self-intersections
  - isolated polygons, etc.
- Repair should not lose geometry features:
  - sharp edges and corners in CAD models

What has been done?

- Point-based method
  - polygon information is lost
- Polygon-based method
  - can not guarantee closeness
- Volumetric method
  - hard with large mesh and complex errors

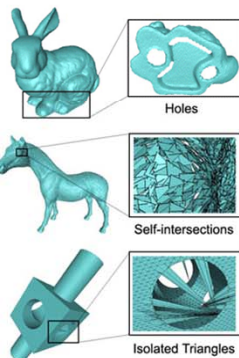
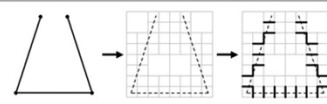


Figure 3. Non-closed polygonal models (left) with closeup looks at the various types of mesh errors (right).

### Volumetric Approach

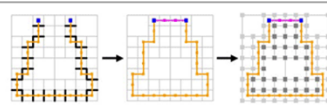
#### 1. Scan conversion

- Embed the model in an octree grid and detect grid edges that intersect the polygons.
- Top-down octree construction with no need to store the original mesh.
- Use separating axis with integer operations for numerically stable and fast intersection tests.



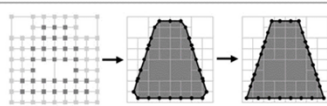
#### 2. Sign generation

- Construct a dual surface on the octree by building one face for each grid edge that intersects the original model.
- Detect edges on the dual surface shared by odd number of faces, and remove them by adding patches. The patched dual surface is closed.
- Build signs on the grid indicating inside/outside of the dual surface.



#### 3. Contouring

- Contouring is the process of generating polygons that approximate the zero-surface of a signed volume.
- Marching Cubes can be used for generating closed, manifold model.
- For CAD models, dual contouring can be used for generating a closed model while preserving sharp edges and corners.



### 3D Illustration

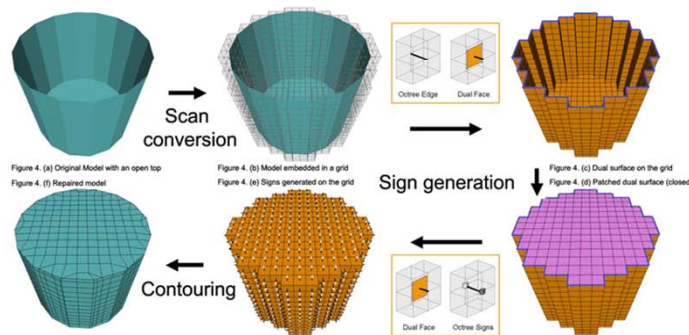


Figure 4. (a) Original Model with an open top  
Figure 4. (f) Repaired model

Figure 4. (b) Model embedded in a grid  
Figure 4. (e) Signs generated on the grid

Figure 4. (c) Dual surface on the grid  
Figure 4. (d) Patched dual surface (closed)

### Examples

#### 1. Repairing gigantic laser-scanned models (56 Million triangles, with holes, took 53 min/ 420 MB)

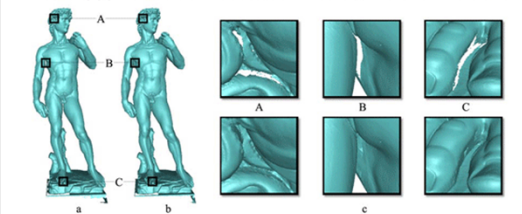


Figure 5. Repairing David: the original model at 1mm resolution (a), the repaired model at the same resolution (b), and close-ups on the model before repair (top row in (c)) and after repair (bottom row in (c)).

#### 2. Repairing CAD models (with isolated triangles)

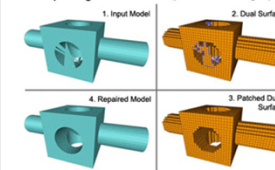


Figure 6. Removing isolated triangles from CAD models

#### 3. Repairing random models

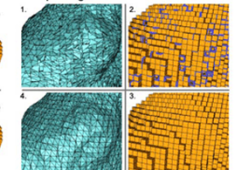


Figure 7. Removing self-intersections from a random bag of polygons

### Highlights

**Robust** Closes arbitrary polygonal models

**Efficient** Repairs gigantic models on PCs

**Accurate** Preserves geometry features

Model	Triangles	Grid	Time	Memory
Bunny	69,451	64	3.6 sec	< 10 MB
Horse	80,805	128	6.0 sec	< 10 MB
Dragon	871,414	256	45.2 sec	16 MB
Buddha	1,687,716	1024	1.3 min	28 MB
David (2mm)	8,254,150	4096	6.4 min	92 MB
David (1mm)	66,230,343	8192	53.2 min	417 MB

### Acknowledgements

Special thanks to the Stanford Graphics Laboratory for the various models including the bunny, the horse, and the David model. Thanks Chen Shen for resolving the teapot pictures. Finally, I want to give heartfelt thank to my advisor, Joe Warren, for his continuous support and insightful comments.



# Critique these posters:

## Were Victorian Fallen Women Doomed?

LAURA  
GARDNER  
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RICE

### The Question of REINTEGRATION

Could a Victorian woman ever transform from a  
**Fallen Woman** into a **Respectable Matron**?



The prostitute Nancy Brown (1871) by J.M.W. Turner



Queen Victoria, symbol of respectable femininity

Victorian literature portrays how numerous respectable ladies become fallen women—women who have had heterosexual relations outside of marriage. Often, polite society shuns the fallen woman, leaving her to endure a disgraced, alienated life.

But could fallen women ever reintegrate into society? Could a fallen woman ever regain her former status or even marry a respectable man?

I posit that a significant number of Victorian fallen women, real and fictional, reintegrated into society. I also propose that an even greater number empowered themselves by constructing and controlling their own narratives.

#### Methodology

This project examines the representation of fallen women in both literary and historical accounts. I consulted Victorian handbooks on rescuing fallen women, treatises on prostitution, the annual reports of reform shelters for fallen women, and the records of rescue societies such as the Female Mission to the Fallen. In my research, I try to locate the stories of fallen women's reintegration and empowerment.

### Special Thanks

Professor Robert L. Patten, Rice University  
Professor John Sutherland, University College London  
Professor Helena Michie, Rice University  
Rice Undergraduate Scholars Program  
The British Library  
The Wellcome Trust Library

### The Common View

#### • Fallen women never reintegrated

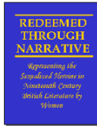


In her study *Fallenness in Victorian Women's Writing*, Deborah Anna Logan contends that **most fictional fallen women were never fully reintegrated into society.**

Logan studies mostly lower-class fallen characters created by female authors. Of the fallen characters she analyzes, all are "punished by the literal and metaphorical death or disfigurement of themselves or their children; **none of them marries or otherwise achieves social integration.**"

Logan concludes, "What was true of eighteenth-century writers on the fallen woman theme remains true a century later: **no author has yet been so bold as to permit a lady to live and marry, and be a woman after this strain.**"

#### • Fallen women were silent, passive victims



Roxanne Eberle's dissertation, "Redeemed through Narrative: Representing the Sexualized Heroine in Nineteenth-Century British Literature by Women," presents an even bleaker view of the Victorian fallen woman.

According to Eberle, Victorians imagined only one fate for the fallen woman, known as the "Harlot's Progress." She summarizes, "girl is seduced, girl suffers, girl repents, and girl dies."

Eberle continues, "The sexually transgressive heroine of the Victorian period is not the philosophical and self-conscious speaking subject found in Romantic texts." Although her plight is recorded in social reform literature, it only "informs us of a great 'social evil' of which she is a victim and rarely a critic." This statement implies that fallen women never thoughtfully articulated their pasts and never knew any life besides victimization.

#### • Reform shelters oppressed fallen women

In her dissertation, Eberle also asserts that the Magdalen reform shelters established to reintegrate fallen women were **victimizing structures**. She writes, "Magdalen houses are merely a literal manifestation of the growing cultural desire to police female sexuality through law, medicine, and other institutions." These reform shelters, also known as Homes, only strove to "isolate fallen women," suppress their stories, and "shut 'contaminated' female bodies up."

Eberle affirms that Victorian fallen women "tend to be acted upon; they are inevitably the passive recipients of disciplinary politics."

### Selected Sources

Eberle, Roxanne, dissertation, "Redeemed through Narrative: Representing the Sexualized Heroine in Nineteenth-Century British Literature by Women," University of California at Los Angeles, 1994.  
Logan, Deborah Anna, *Fallenness in Victorian Women's Writing*, Columbia: University of Missouri, 1998.  
Mumm, Susan, "'Not Worse Than Other Girls': The Convent-Based Rehabilitation of Fallen Women in Victorian Britain," *Journal of Social History* 29 (1996): 527-546.  
Tait, William, *Magdalenism*, Edinburgh: P. Rickard, 1842.  
*The 1866 Annual Report*, London, The Female Mission to the Fallen, 1866.

### Challenges from MY RESEARCH

#### • Victorian authors depicted women marrying after a sexual fall

In *David Copperfield* (1849-1850) by Charles Dickens, Martin Endell, a former prostitute, emigrates to Australia and **marries a farm-laborer.**

Wilkie Collins's *The New Magdalen* (1876) focuses on the reintegration of Mercy Merrick, a former reform shelter inmate. Mercy **marries a clergyman** and subsequently emigrates to the New World with her husband.

#### • 'Real' fallen women also married

The 1866 report of *The Female Mission to the Fallen* records how one rehabilitated fallen woman is "now engaged to be **married to the son of a clergyman**, with the full consent of the young man's family." Numerous other marriages are narrated in these reports.

#### • Not all Victorian fallen women were victims

Victorian reform writer William Tait declares that **no fallen woman "ought to be given up as being beyond the reach of remedy."**

In 1866, the Female Mission announced plans to employ a Missionary to deal exclusively with **preventing fallen women from committing suicide**. After rescuing these women, Missionaries found them employment or helped them enter reform shelters.

#### • Fallen women controlled their narratives

William Makepeace Thackeray's *Henry Reckless* (1846-48) portrays the advances of Becky Sharp. After living on the margins of society for a while, Becky uses the narrative of her victimization—**isolation from her son, threats of suicide, consorting with questionable company—to gain sympathy and financial support from the other characters.**

### Reform Shelters: A Different Perspective

#### • GOAL: To reintegrate women, not isolate them

Reform shelters operated with the specific intention of **reassimilating fallen women into society**. According to Tait, after their stay in the shelters, women did "become useful and honorable members of society."

#### • Making victims into agents

Susan Mumm, a scholar at York University, has documented how church-based reform shelters attempted to give their inmates increased agency by "giving them **specialized training**." As a higher-status servant such as "parlourmaids," women might be better able to **defend themselves from the advances of others**.

#### • Publishing the fallen woman's narrative

Each year, reform shelters and agencies published reports detailing the cases they helped. Reform workers narrate the circumstances of the women's falls. **These case histories do not gloss over the poverty, assault, and exploitation faced by these women.** Often the reports include letters by the fallen women describing their new lives in society.



Thomas Cole, *The Asylum* (1840)

# Critique these posters:

## VITAMIN C: THE MULTIFUNCTIONAL ANTIOXIDANT

Rice University

### BACKGROUND

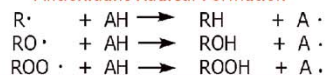
Vitamin C (Ascorbic Acid) is an essential nutrient discovered in 1932 by Albert Szent-Györgyi, who isolated the antiscorbutic factor as pure crystalline material from lemon juice. In the past 25 years, much of the vitamin's biochemical functions have been elucidated, inducing vitamin C to the treatment of viral infections, diabetes, and even cancer prevention. Today, scientists' growing knowledge of ascorbic acid uncovers the significance of its antioxidant property, making its organic synthesis one of high demand for research and public consumption.

### ANTIOXIDANT PROTECTION

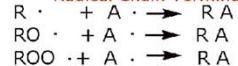
- Stability of antioxidant free radicals
- Resonance delocalization
- Further oxidation of antioxidant radicals
- Reduction of radical species

### REACTION MECHANISMS

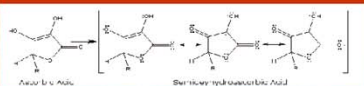
#### Antioxidant Radical Formation



#### Radical Chain Termination

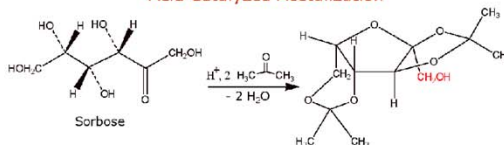


### ANTIOXIDANT RADICAL STABILITY

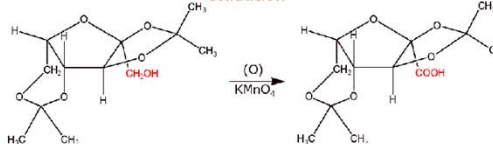


### ORGANIC SYNTHESIS OF VITAMIN C

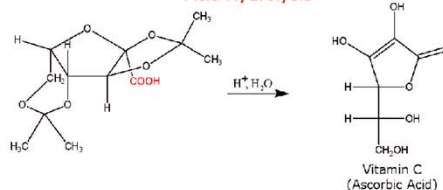
#### Acid Catalyzed Acetalization



#### Oxidation



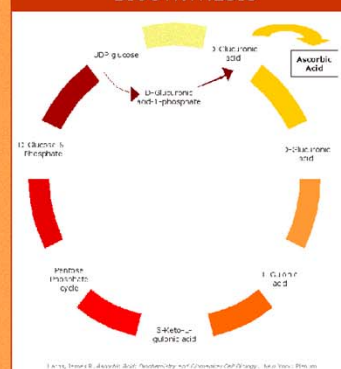
#### Acid Hydrolysis



### BIOLOGICAL BENEFITS

- Defense against common cold
- Collagen formation
- Absorption of inorganic iron
- Metabolism of folic acid, amino acids, and hormones
- Protection of DNA, cell membranes, and critical molecules from radicals

### BIOSYNTHESIS



### CHEMICAL FUNCTIONS

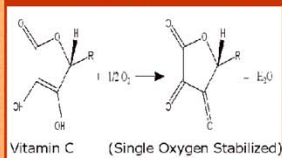
#### Antioxidant

- Hydrogen donation to lipid radicals
- Removal of molecular O
- Quenching of singlet O
- Regeneration of tocopherol radicals

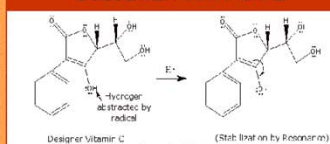
#### Prooxidant

- Reduction of Fe<sup>3+</sup> to Fe<sup>2+</sup>

### OXYGEN SCAVENGER



### DESIGNER VITAMIN C



# Critique these posters:

## Higgs-Boson Physics

### Motivation

The Higgs boson is the only particle in the Standard Model whose existence is not predicted by any other theory. Its discovery is a major milestone in particle physics.

### $h \rightarrow \gamma\gamma$ and $H \rightarrow \gamma\gamma$

### $H \rightarrow ZZ \rightarrow 4 \text{ leptons}$

### $h \rightarrow b\bar{b}$ and $H \rightarrow b\bar{b}$

### $H \rightarrow \tau\tau$ and $A \rightarrow \tau\tau$

The ATLAS and CMS experiments have discovered the Higgs boson in 2012. This poster summarizes the current status of Higgs boson physics, including the discovery, production, and decay channels. It also discusses the ongoing search for the CP-odd Higgs boson A and the charged Higgs boson H±.

# Heavy Ion Physics

High-energy Heavy Ion Physics studies strongly interacting matter at extreme energy densities. QCD predicts that in such conditions hadronic matter turns into a plasma of deconfined quarks and gluons, the Quark Gluon Plasma (QGP). Matter in the ultrarelativistic limit is expected to be a nearly perfect fluid. The study of the phase diagram of matter is a new approach to investigate QCD in its natural scale,  $\Lambda_{QCD}$ , and to address the fundamental questions of confinement and chiral-symmetry breaking. The combined results obtained by the SPS heavy ion experiments, in particular those obtained with the Pb beam, provide compelling evidence for the existence of a new state of matter featuring many of the characteristics predicted for the QGP. The ALICE experiment will carry this research into the LHC era.

## Results from the SPS Heavy Ion Experiments

### Longitudinal and Transverse Expansion

### Energy Deposition and Particle Yields

### Strangeness Enhancement

### Low Mass Dilepton Enhancement

### $J/\psi$ Suppression

### Direct Photons

### ALICE: the LHC Experiment devoted to Heavy Ions

ALICE will perform a comprehensive study of hadrons, electrons, muons and photons produced in Pb-Pb collisions. It will also study collisions at smaller energy densities by using lower mass ions, as well as proton-gold collisions.

The ALICE experiment is a large-scale detector system, designed to study the properties of the QGP. It consists of a central tracking system, a particle identification system, and a calorimetry system. The ALICE experiment is the only experiment at the LHC that is dedicated to heavy ion collisions.

The ALICE experiment is a large-scale detector system, designed to study the properties of the QGP. It consists of a central tracking system, a particle identification system, and a calorimetry system. The ALICE experiment is the only experiment at the LHC that is dedicated to heavy ion collisions.

1200 Scientists  
13 Experiments  
27 Countries

SPS and LHC

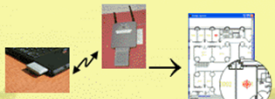
# Critique these posters:

Practical Robust Localization over Large-Scale 802.11 Wireless Networks

Andreas Haeberlen   Eliot Flannery   Andrew M. Ladd   Algis Rudys   Dan S. Wallach   Lydia E. Kavraki

Contact: Andreas Haeberlen · DH3001 · 713-348-3726 · ahae@cs.rice.edu

1 What does it do?



Our technique uses **Wireless Ethernet** to determine the **location** of a mobile device (PDA, Notebook...) in a building

2 Why use it?

- **Navigation:** Visitor/tourist guides
- **Advertising:** Location-aware ads
- **Robotics:** Helps a robot navigate
- **Security:** Finds 'wireless' hackers
- **Asset tracking:** Warehouses etc.

GPS does not work indoors!  
Wireless Ethernet is widely available!

3 How good is it?

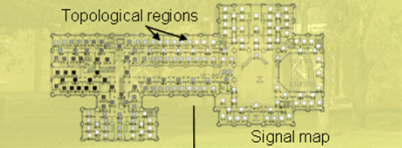
- **Accurate:** Finds the correct room in more than 95% of all attempts!
- **Good failure modes:** Incorrect results are almost always in adjacent rooms
- **Robust:** Works with different hardware and in changing environments
- **Fast:** Result available in seconds; can even track moving users!

4 What's new?

- **Much lower training time** than previous techniques (hours, not days!)
- **Calibration technique** to compensate for hardware/environment changes
- **Better robustness** due to Gaussian signal model
- **Topological localization** combined with Markov localization

5 How does localization work?

**Training:** Collect signal strength measurements in the entire building. This needs to be done only once!

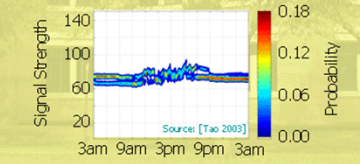


$$\hat{\pi}_{i+1} = \frac{P(o_j | s_i) \hat{\pi}_i}{\eta}$$
 Bayes' formula

**Localization:** Device measures signal strength of all base stations in range and uses Markov localization to update its location estimate

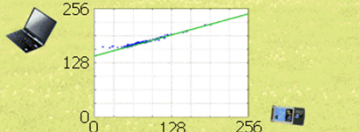
6 How does calibration work?

**Problem:** Reported signal strength values are different for different hardware, and can change over time.



Source: [Tao 2003]

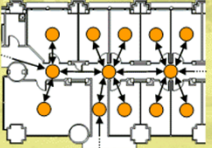
**Solution:** Approximate the mapping from 'old' values to 'new' values by a linear function; apply inverse function to each observation before giving it to the localizer



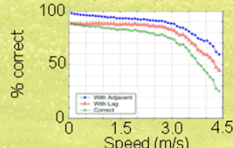
Parameters can be estimated automatically, or by collecting a few measurements at a known location

7 How does tracking work?

Use Markov chain to model user movement, and update location estimate after each iteration



Markov chain encodes knowledge about topology: Cannot move through walls, jump through ceilings, ...



**Result:** Excellent accuracy up to speeds of 3-4 m/s, with one location update every 1.6 seconds