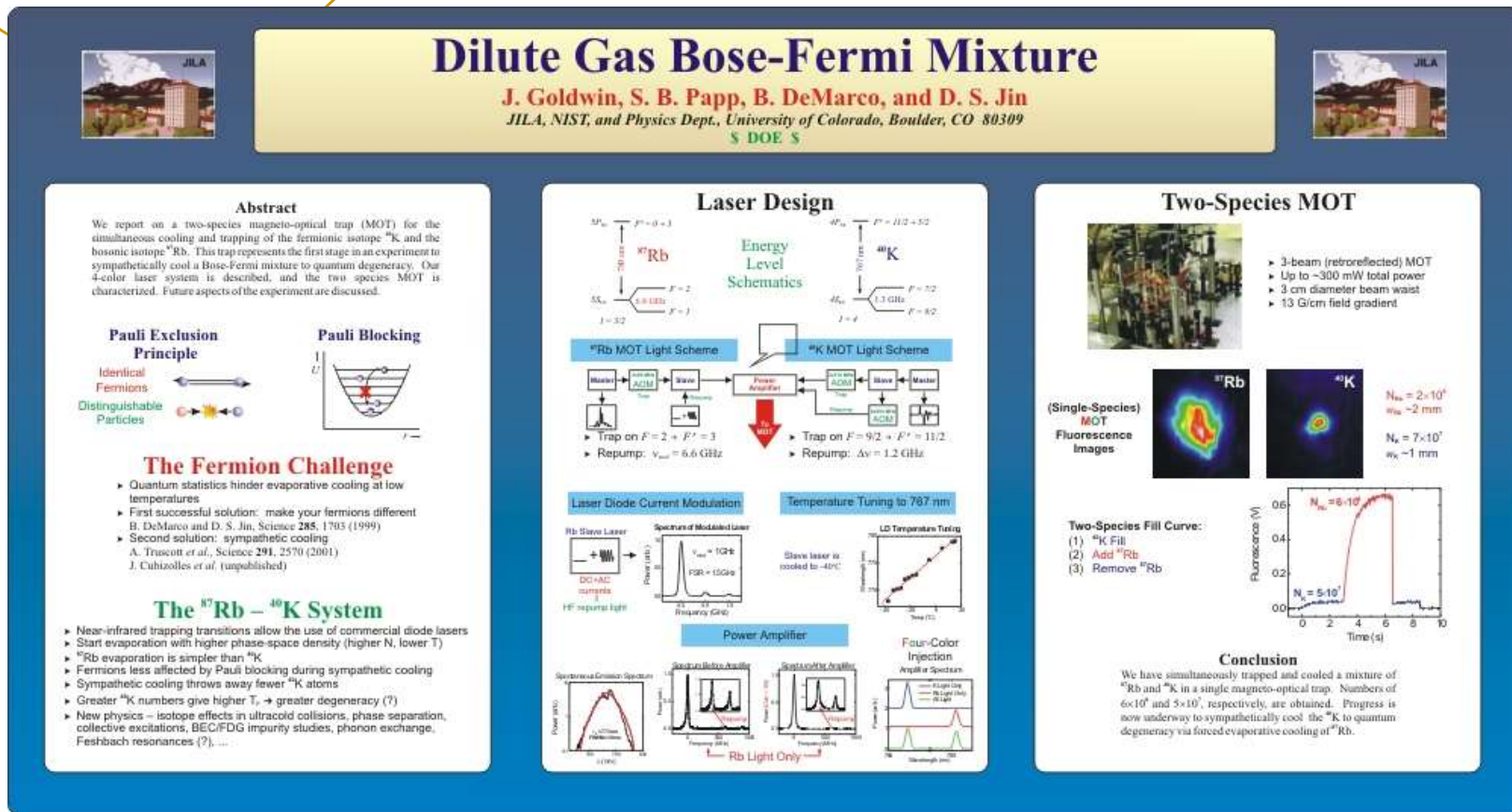


Tips for Making Scientific Posters



Courtesy B. DeMarco

Source: The Craft of Scientific Presentations, Michael Alley

See also: <https://www.research.undergraduate.vt.edu/our-services/for-students/poster-tips.html>

Why a scientific poster?

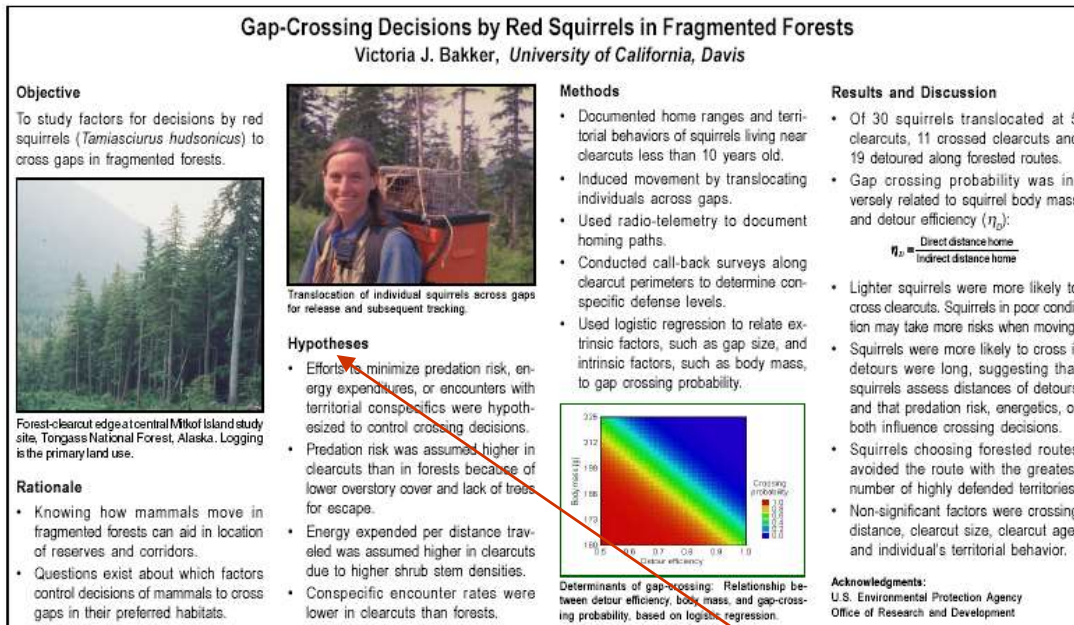
One of the most common methods of disseminating scientific information at conferences!



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



Good!

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

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

Too little description...the reader must be able to understand your poster if you're not there to explain it

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

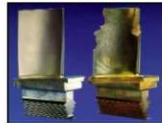


Jet engines

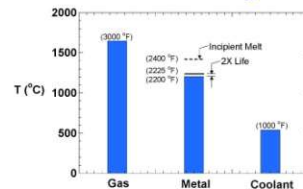


Power turbines

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

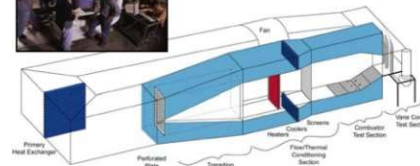


Better cooling schemes can dramatically affect the life of blades and vanes in gas turbines

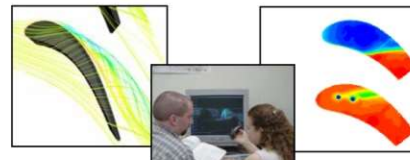


If a cooling scheme can decrease the temperatures that a blade experiences by 25°C, the blade's life will double

Our laboratory studies cooling schemes through experiments and computations

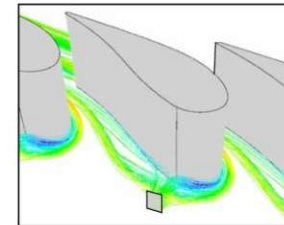


Wind Tunnel Experiments

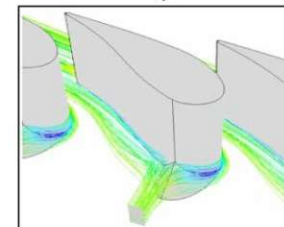


Computational Predictions

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



Without Fillet: Unwanted Vortices

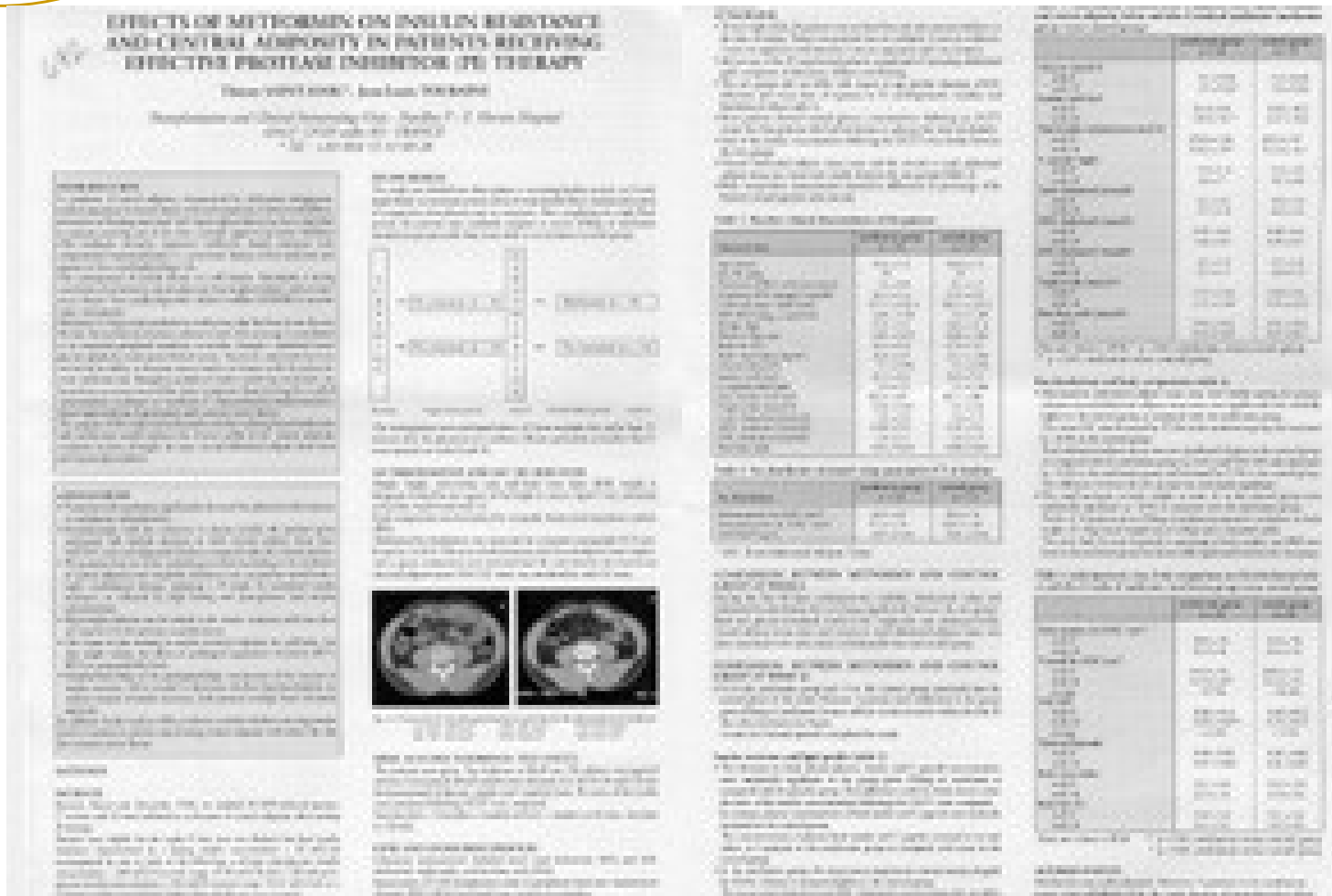


With Fillet: Vortices Reduced

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

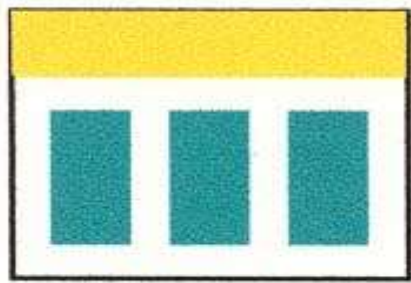
Posters should have more description than a talk slide, less description than a paper

(Way) too much description:



How to get started

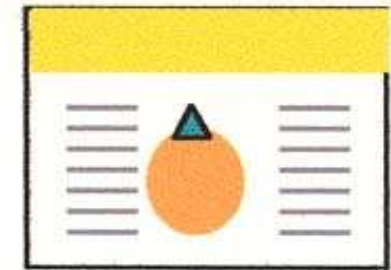
Choose a poster layout



vertical columns



contrasting fields



centered images w/ explanations

Robust Repair of Polygonal Models

Tao Ji (jia@cs.umn.edu), Department of Computer Science, University of Minnesota, TX

Polygonal Models



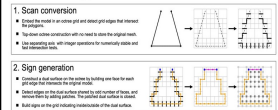
Original models are best suited for representing 2D objects in computer graphics. They consist of a set of vertices, edges, and faces. The faces are usually triangles or quadrilaterals. The faces are connected to form a closed surface. The faces are usually triangles or quadrilaterals. The faces are connected to form a closed surface.

Model repair is a process of repairing a polygonal model that has been damaged or corrupted. It involves identifying the damaged areas and replacing them with new polygons. This process is often used in computer graphics and animation.

Why do we need it? Polygonal models are widely used in computer graphics and animation. They are often used to represent 3D objects. However, they can be damaged or corrupted. This can lead to problems in rendering and animation. Model repair is a process of repairing a polygonal model that has been damaged or corrupted.

What has been done? There have been several methods for repairing polygonal models. These methods often involve identifying the damaged areas and replacing them with new polygons. However, these methods can be time-consuming and error-prone. The proposed method is a more efficient and accurate way to repair polygonal models.

Volumetric Approach



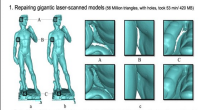
1. Scan conversion: This process involves converting a 3D model into a volumetric representation. This is done by projecting the model onto a 2D plane and then discretizing the resulting image into a grid of pixels. This process is often used in computer graphics and animation.

2. Sign generation: This process involves generating a sign for each pixel in the volumetric representation. The sign is determined by the depth of the pixel relative to the viewer. This process is often used in computer graphics and animation.

3. Contouring: This process involves identifying the contours of the volumetric representation. This is done by finding the boundaries between different levels of the model. This process is often used in computer graphics and animation.

3D Illustration: This section shows a 3D illustration of the repair process. It includes a diagram of a 3D model being converted into a volumetric representation, followed by a diagram of the sign generation and contouring processes. This illustrates how the repair process is applied to a 3D model.

Examples



1. Repairing a 3D model of a human figure. The original model is shown on the left, and the repaired model is shown on the right. The repair process involves identifying the damaged areas and replacing them with new polygons.

2. Repairing a 3D model of a horse. The original model is shown on the left, and the repaired model is shown on the right. The repair process involves identifying the damaged areas and replacing them with new polygons.

3. Repairing a 3D model of a horse. The original model is shown on the left, and the repaired model is shown on the right. The repair process involves identifying the damaged areas and replacing them with new polygons.

Model	Vertices	Edges	Faces	Time (seconds)
Human	10000	15000	10000	10.0
Horse	5000	7500	5000	5.0
Human	10000	15000	10000	10.0
Horse	5000	7500	5000	5.0
Human	10000	15000	10000	10.0
Horse	5000	7500	5000	5.0

Acknowledgements

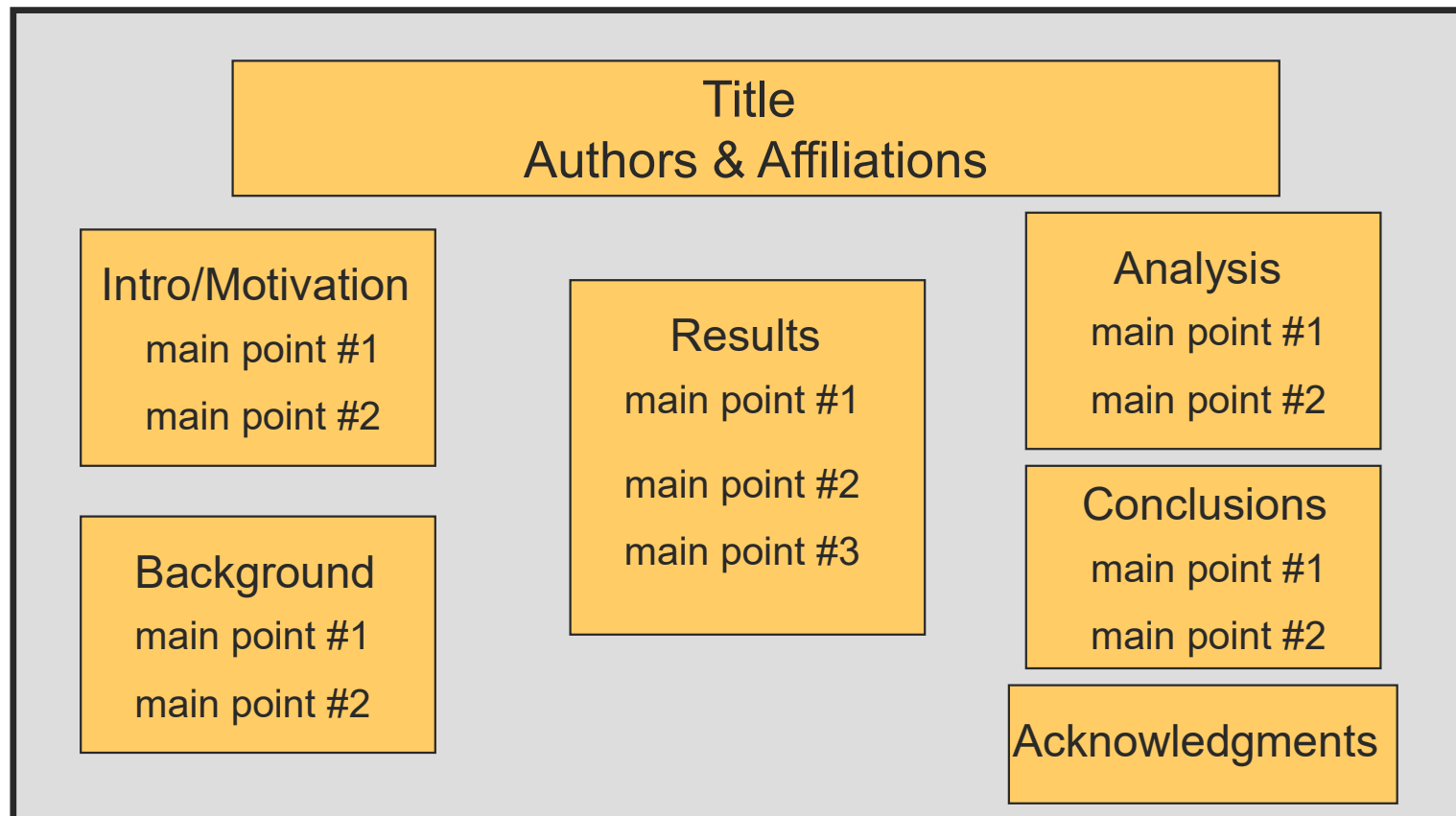
This work is supported by the National Science Foundation for the award number IRI-0344382. The author would like to thank the anonymous reviewers for their helpful comments and suggestions.

How to get started

Sketch your organizational plan on paper

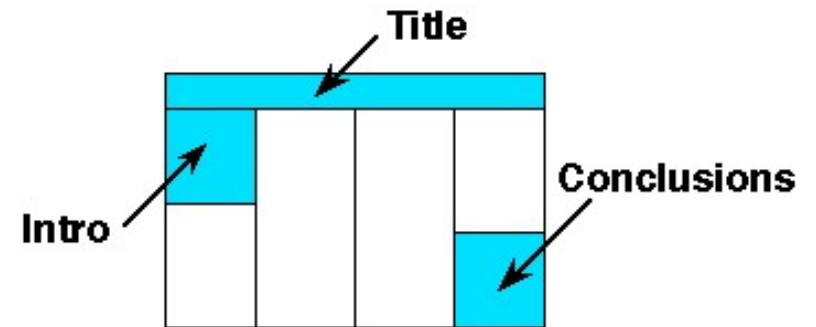
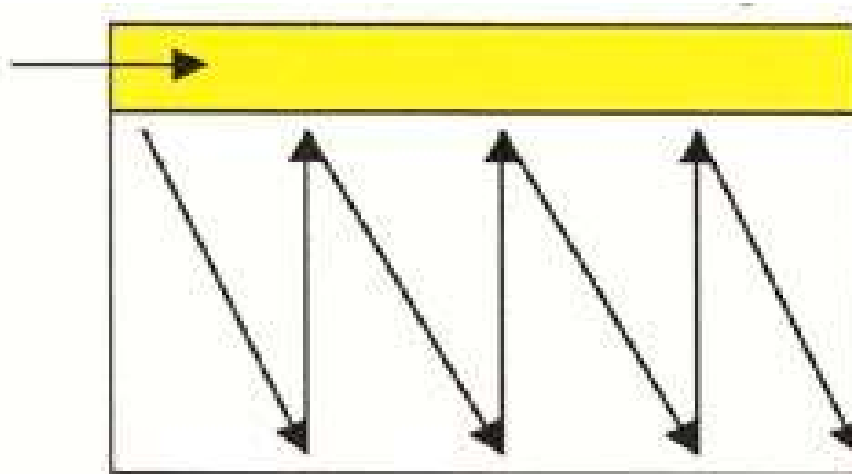
Write down the key ideas in each section

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

<http://www.owl.net.rice.edu/~cainproj/designing.html>


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
\$ DOE \$




Abstract

We report on a two-species magneto-optical trap (MOT) for the simultaneous cooling and trapping of the fermionic isotope ^{40}K and the bosonic isotope ^{87}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.

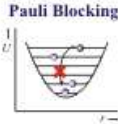
Pauli Exclusion Principle

Identical Fermions

Distinguishable Particles



Pauli Blocking



The Fermion Challenge

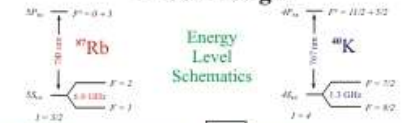
- Quantum statistics hinder evaporative cooling at low temperatures
- First successful solution: make your fermions different
B. DeMarco and D. S. Jin, *Science* **285**, 1703 (1999)
- Second solution: sympathetic cooling
A. Truscott *et al.*, *Science* **291**, 2570 (2001)
J. Cubizolles *et al.* (unpublished)

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

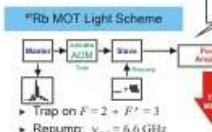
- Near-infrared trapping transitions allow the use of commercial diode lasers
- Start evaporation with higher phase-space density (higher N, lower T)
- ^{87}Rb evaporation is simpler than ^{40}K
- Fermions less affected by Pauli blocking during sympathetic cooling
- Sympathetic cooling throws away fewer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

Laser Design

Energy Level Schematics

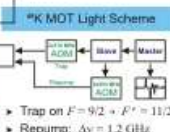


^{87}Rb MOT Light Scheme



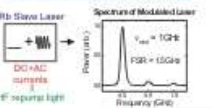
Trap on $F = 2 + F' = 3$
Repump: $\nu_{\text{repump}} = 6.6 \text{ GHz}$

^{40}K MOT Light Scheme



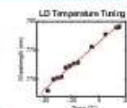
Trap on $F = 9/2 + F' = 11/2$
Repump: $\Delta\nu = 1.2 \text{ GHz}$

Laser Diode Current Modulation

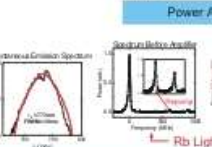


Slave Laser is locked to -40°C

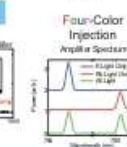
Temperature Tuning to 787 nm




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

^{87}Rb



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

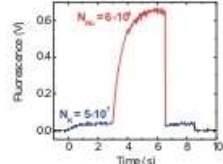
^{40}K



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

Two-Species Fill Curve:

- ^{40}K Fill
- Add ^{87}Rb
- Remove ^{87}Rb



$N_{\text{tr}} = 6 \times 10^7$
 $N_{\text{tr}} = 5 \times 10^7$

Conclusion

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

How to get started

Setting up PowerPoint:

On the “Design Tab”, click Slide Size

Select: Custom Slide Size

Orientation of slides: Landscape

Width of slides: 56 inches

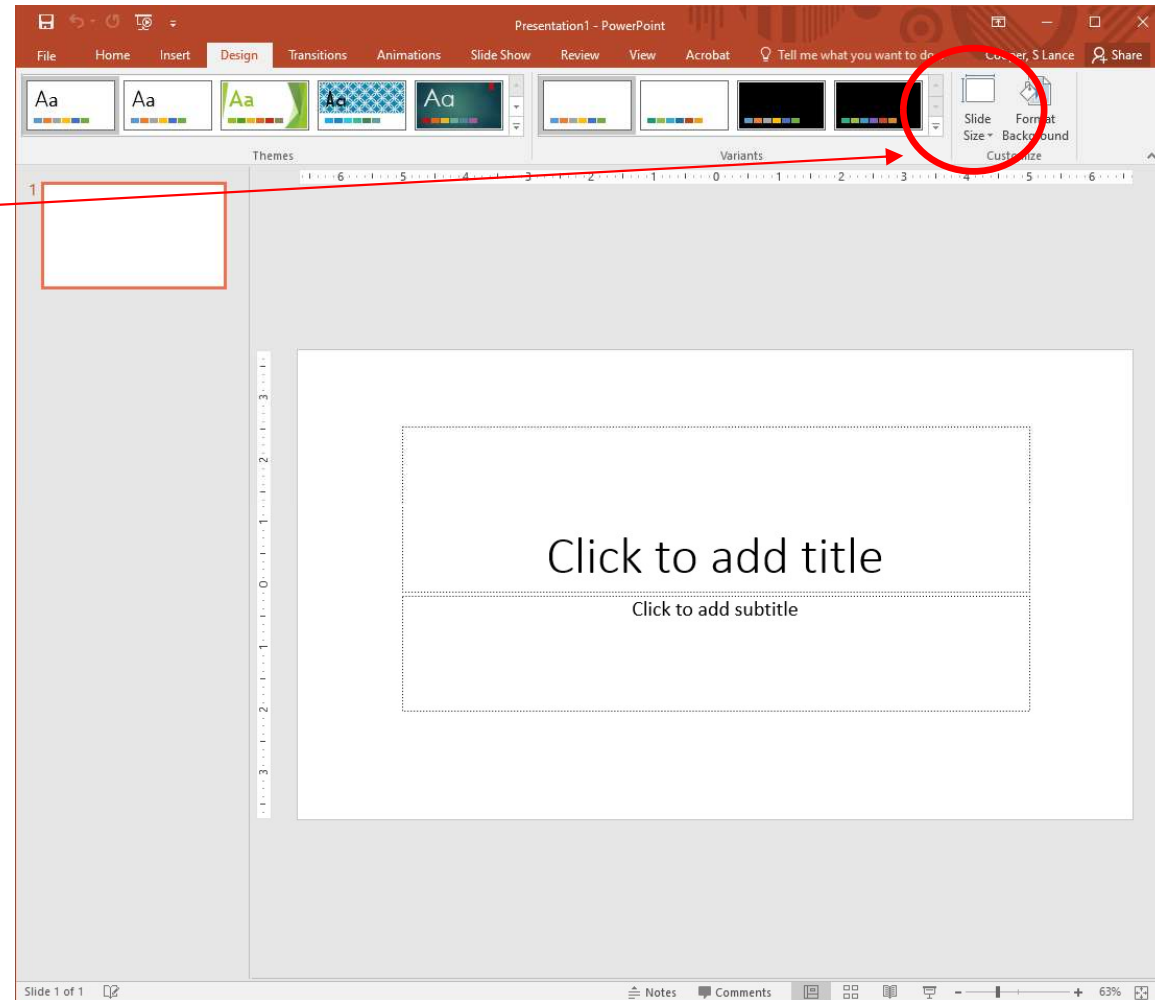
Height of slides: 28 inches

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

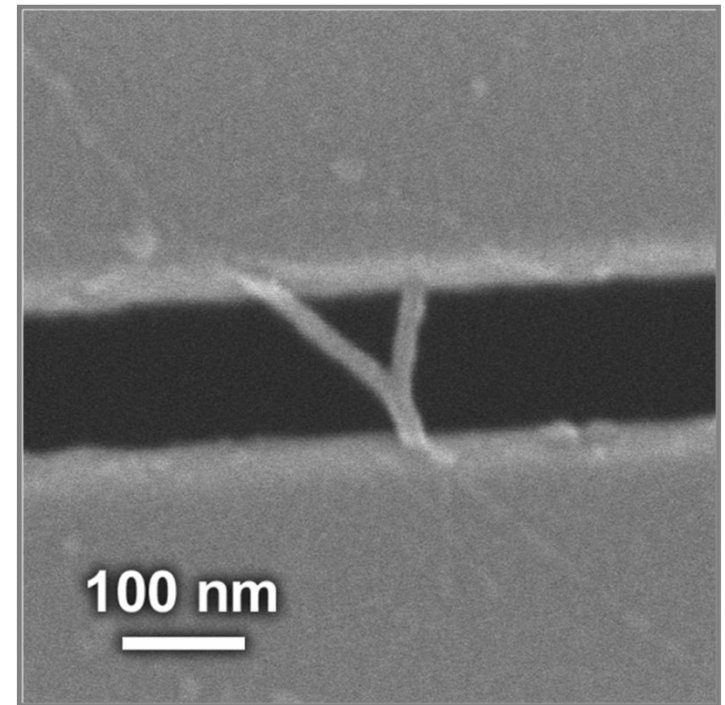
Make sure to label all figures with legible fonts and font sizes

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.

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.

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.

RESULTS

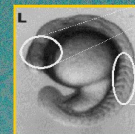


Figure 1: Expression of the CDC25 in the Retinal Ganglion Cells at the Terminal Mitosis Stage.

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



Critique these posters:

Robust Repair of Polygonal Models

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

Polygonal Models

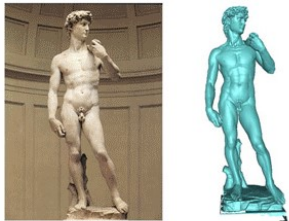


Figure 1. The statue of David by Michelangelo in the Galleria dell'Accademia in Florence (left), and the polygonal model reconstructed from laser range scans (right).

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

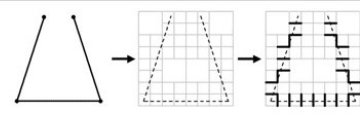
What has been done?

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

Volumetric Approach

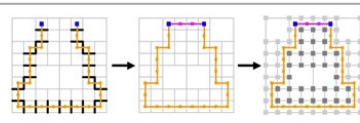
1. Scan conversion

- 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.



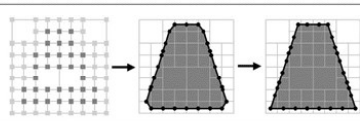
2. Sign generation

- 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.

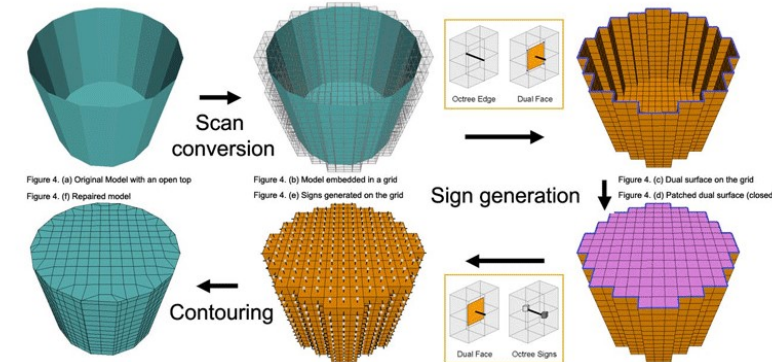


3. Contouring

- 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



Examples

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

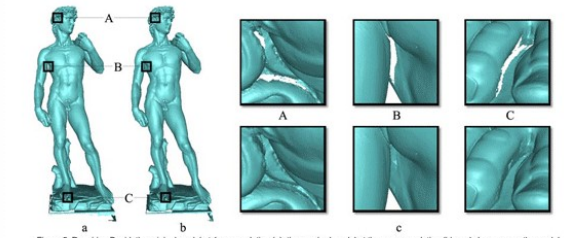


Figure 5. Repairing David: the original model at 1mm resolution (a), the repaired model at the same resolution (b), and close-ups on the model before repair (top row in (c)) and after repair (bottom row in (c)).

2. Repairing CAD models (with isolated triangles)

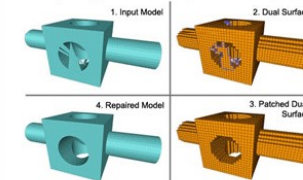


Figure 6. Removing isolated triangles from CAD models

3. Repairing random models

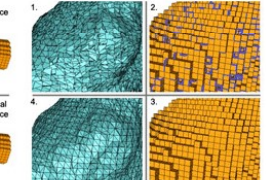


Figure 7. Removing self-intersections from a random bag of polygons

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	1,087,716	1024	1.3 min	28 MB
David (2mm)	9,254,150	4096	8.4 min	92 MB
David (1mm)	56,230,343	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 providing 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
laurag@rice.edu
RICE

The Question of REINTEGRATION

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



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

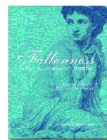
This project examines the representation of fallen women in both literary and historical accounts. I consulted Victorian handbooks on rescuing fallen women, treatises on prostitution, the annual reports of reform shelters for fallen women, and the records of rescue societies such as the Female Mission 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 reduced, 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, Therele 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 invariably 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, Martha 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 *Vanity Fair* (1846-48) portrays the adventures 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 re-socializing 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.



University College, the shelter run by Dickens

Critique these posters:

VITAMIN C: THE MULTIFUNCTIONAL ANTIOXIDANT

Rice University

BACKGROUND

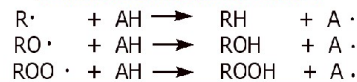
Vitamin C (Ascorbic Acid) is an essential nutrient discovered in 1932 by Albert Szent-Györgyi, who isolated the antiscorbutic factor as pure crystalline material from lemon juice. In the past 25 years, much of the vitamin's biochemical functions have been elucidated, inducing vitamin C to the treatment 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

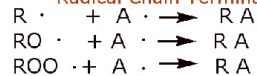
- Stability of antioxidant free radicals
- Resonance delocalization
- Further oxidation of antioxidant radicals
- Reduction of radical species

REACTION MECHANISMS

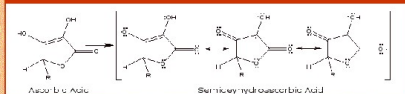
Antioxidant Radical Formation



Radical Chain Termination

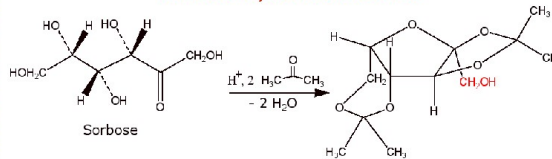


ANTIOXIDANT RADICAL STABILITY

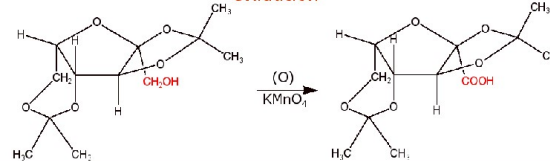


ORGANIC SYNTHESIS OF VITAMIN C

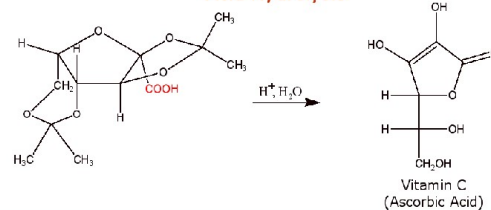
Acid Catalyzed Acetalization



Oxidation



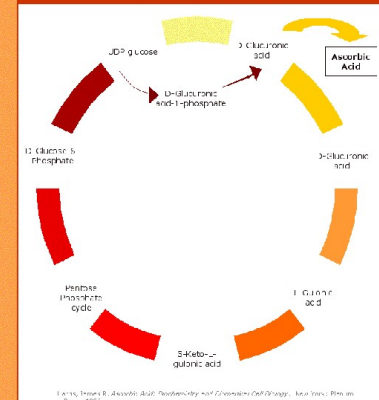
Acid Hydrolysis



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

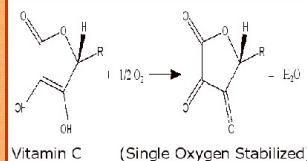
Antioxidant

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

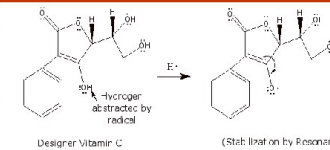
Prooxidant

- Reduction of Fe³⁺ to Fe²⁺

OXYGEN SCAVENGER



DESIGNER VITAMIN C



Critique these posters:

Heavy Ion Physics

High-energy Heavy Ion Physics studies strongly interacting matter at extreme energy densities. QCD predicts that at such densities hadronic matter turns into a plasma of deconfined quarks and gluons, the Quark Gluon Plasma (QGP). Matter in the Universe must have existed in this state up to about 10⁻⁶ after the Big Bang. Today, QGP might exist in the core of neutron stars. The study of the phase diagram of matter is a new approach to investigate QCD at its natural scale Λ_{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

Large, extended Pb nuclei undergo a series of high energy density, strong interactions during the collision. The resulting matter expands longitudinally and transversely. The expansion is characterized by the formation of a QGP, which is a state of matter with a high energy density and a high temperature. The expansion is characterized by the formation of a QGP, which is a state of matter with a high energy density and a high temperature.

Energy Deposition and Particle Yields

The energy deposited in the collision zone is converted into the energy of the particles produced. The energy is deposited in the collision zone, and the particles produced are the result of the energy being converted into the energy of the particles produced. The energy is deposited in the collision zone, and the particles produced are the result of the energy being converted into the energy of the particles produced.

Strangeness Enhancement

Strangeness enhancement is observed in all systems. The strangeness enhancement is observed in all systems. The strangeness enhancement is observed in all systems. The strangeness enhancement is observed in all systems. The strangeness enhancement is observed in all systems.

Low Mass Dilepton Enhancement

Resonance and dilepton enhancement are observed in heavy ion collisions. The resonance and dilepton enhancement are observed in heavy ion collisions. The resonance and dilepton enhancement are observed in heavy ion collisions. The resonance and dilepton enhancement are observed in heavy ion collisions.

J/psi Suppression

J/psi production is strongly suppressed in Pb-Pb collisions. The J/psi production is strongly suppressed in Pb-Pb collisions. The J/psi production is strongly suppressed in Pb-Pb collisions. The J/psi production is strongly suppressed in Pb-Pb collisions.

Direct Photons

Direct photons produced in the collision zone are observed. The direct photons produced in the collision zone are observed. The direct photons produced in the collision zone are observed. The direct photons produced in the collision zone are observed.

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-proton collisions.

The new Tracking System (TSS) of ALICE will provide spatial reconstruction and tracking of all particles produced in the collision zone. The primary and secondary vertex reconstruction, the reconstruction of the primary and secondary vertices, the reconstruction of the primary and secondary vertices.

The ALICE TSS will provide spatial reconstruction and tracking of all particles produced in the collision zone. The primary and secondary vertex reconstruction, the reconstruction of the primary and secondary vertices, the reconstruction of the primary and secondary vertices.

The ALICE TSS will provide spatial reconstruction and tracking of all particles produced in the collision zone. The primary and secondary vertex reconstruction, the reconstruction of the primary and secondary vertices, the reconstruction of the primary and secondary vertices.

1200 Scientists
88 Institutions
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!

Location estimate $\vec{\pi}_i$

$P(o_j | s_i)$

Observed signal strength o

$$\vec{\pi}_{i+1} = \frac{P(o_j | s_i) \cdot \vec{\pi}_i}{\eta}$$

Bayes' formula

New location estimate $\vec{\pi}_{i+1}$

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.

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

Informal Homework Assignment

- Walk around the building
 - look at and critique the posters you see
 - which ones are most effective?
 - capture your interest
 - easily navigable
 - etc., etc.
 - which ones are less effective at presenting the key ideas?
- In your poster drafts, emulate effective aspects of posters you like