



Tips for Making Scientific Posters



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
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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

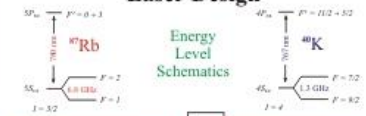
- Quantum statistics hinder evaporative cooling at low temperatures
- First successful solution: make your fermions different
B. DeMarco and D. S. Jin, Science 285, 1703 (1999)
- Second solution: sympathetic cooling
A. Truscott et al., Science 291, 2570 (2001)
J. Cubizolles et al. (unpublished)

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

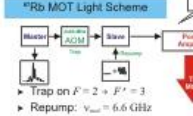
- Near-infrared trapping transitions allow the use of commercial diode lasers
- Start evaporation with higher phase-space density (higher N, lower T)
- ^{87}Rb evaporation is simpler than ^{40}K
- Fermions less affected by Pauli blocking during sympathetic cooling
- Sympathetic cooling throws away fewer ^{40}K atoms
- Greater ^{40}K numbers give higher T → 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

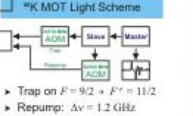


^{87}Rb MOT Light Scheme



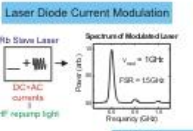
Trap on $F=2 \rightarrow F'=3$
Repump: $\nu_{\text{repump}} = 6.6 \text{ GHz}$

^{40}K MOT Light Scheme

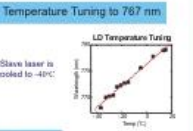


Trap on $F=9/2 \rightarrow F'=11/2$
Repump: $\Delta\nu = 1.2 \text{ GHz}$

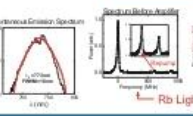
Laser Diode Current Modulation



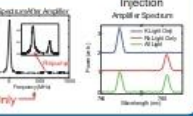
Temperature Tuning to 787 nm




Power Amplifier



Four-Color Injection Amplifier

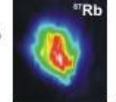


Two-Species MOT



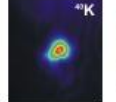
- 3-beam (retroreflected) MOT
- Up to ~300 mW total power
- 3 cm diameter beam waist
- 13 G/cm field gradient

(Single-Species) MOT Fluorescence Images



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

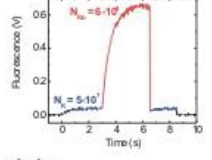
^{40}K MOT Fluorescence Images



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

Two-Species Fill Curve:

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



Fluorescence (V) vs Time (s)

$N_{\text{Rb}} = 8 \cdot 10^7$
 $N_{\text{K}} = 5 \cdot 10^7$

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 $5 \cdot 10^7$, respectively, are obtained. Progress is now underway to sympathetically cool the ^{40}K to quantum degeneracy via forced evaporative cooling of ^{87}Rb .

Courtesy B. DeMarco

Source: The Craft of Scientific Presentations, Michael Alley

See also: <https://www.research.undergraduate.vt.edu/funding-and-support/student-funding-and-support/poster-printing/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

Gap-Crossing Decisions by Red Squirrels in Fragmented Forests

Victoria J. Bakker, University of California, Davis

Objective

To study factors for decisions by red squirrels (*Tamiasciurus hudsonicus*) to cross gaps in fragmented forests.



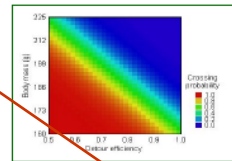
Forest-clearcut edge at central Mill of Island study site, Tongass National Forest, Alaska. Logging is the primary land use.



Translocation of individual squirrels across gaps for release and subsequent tracking.

Methods

- Documented home ranges and territorial behaviors of squirrels living near clearcuts less than 10 years old.
- Induced movement by translocating individuals across gaps.
- Used radio-telemetry to document homing paths.
- Conducted call-back surveys along clearcut perimeters to determine conspecific defense levels.
- Used logistic regression to relate extrinsic factors, such as gap size, and intrinsic factors, such as body mass, to gap crossing probability.



Determinants of gap-crossing: Relationship between detour efficiency, body mass, and gap-crossing probability, based on logistic regression.

Results and Discussion

- Of 30 squirrels translocated at 5 clearcuts, 11 crossed clearcuts and 19 detoured along forested routes.
- Gap crossing probability was inversely related to squirrel body mass and detour efficiency (η_d):

$$\eta_d = \frac{\text{Direct distance home}}{\text{Indirect distance home}}$$
- Lighter squirrels were more likely to cross clearcuts. Squirrels in poor condition may take more risks when moving.
- Squirrels were more likely to cross if detours were long, suggesting that squirrels assess distances of detours and that predation risk, energetics, or both influence crossing decisions.
- Squirrels choosing forested routes avoided the route with the greatest number of highly defended territories.
- Non-significant factors were crossing distance, clearcut size, clearcut age, and individual's territorial behavior.

Acknowledgments:

U.S. Environmental Protection Agency
Office of Research and Development

Rationale

- Knowing how mammals move in fragmented forests can aid in location of reserves and corridors.
- Questions exist about which factors control decisions of mammals to cross gaps in their preferred habitats.

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

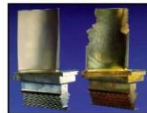


Jet engines

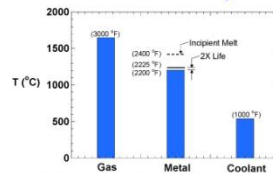
Power turbines



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

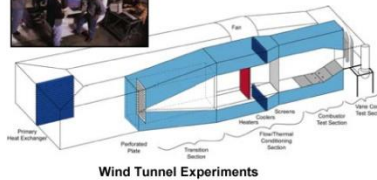


Better cooling schemes can dramatically affect the life of blades and vanes in gas turbines



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

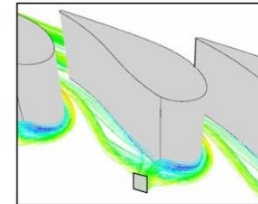


Wind Tunnel Experiments

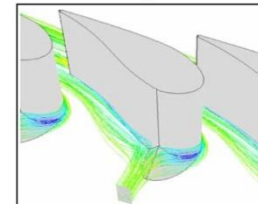


Computational Predictions

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



Without Fillet: Unwanted Vortices

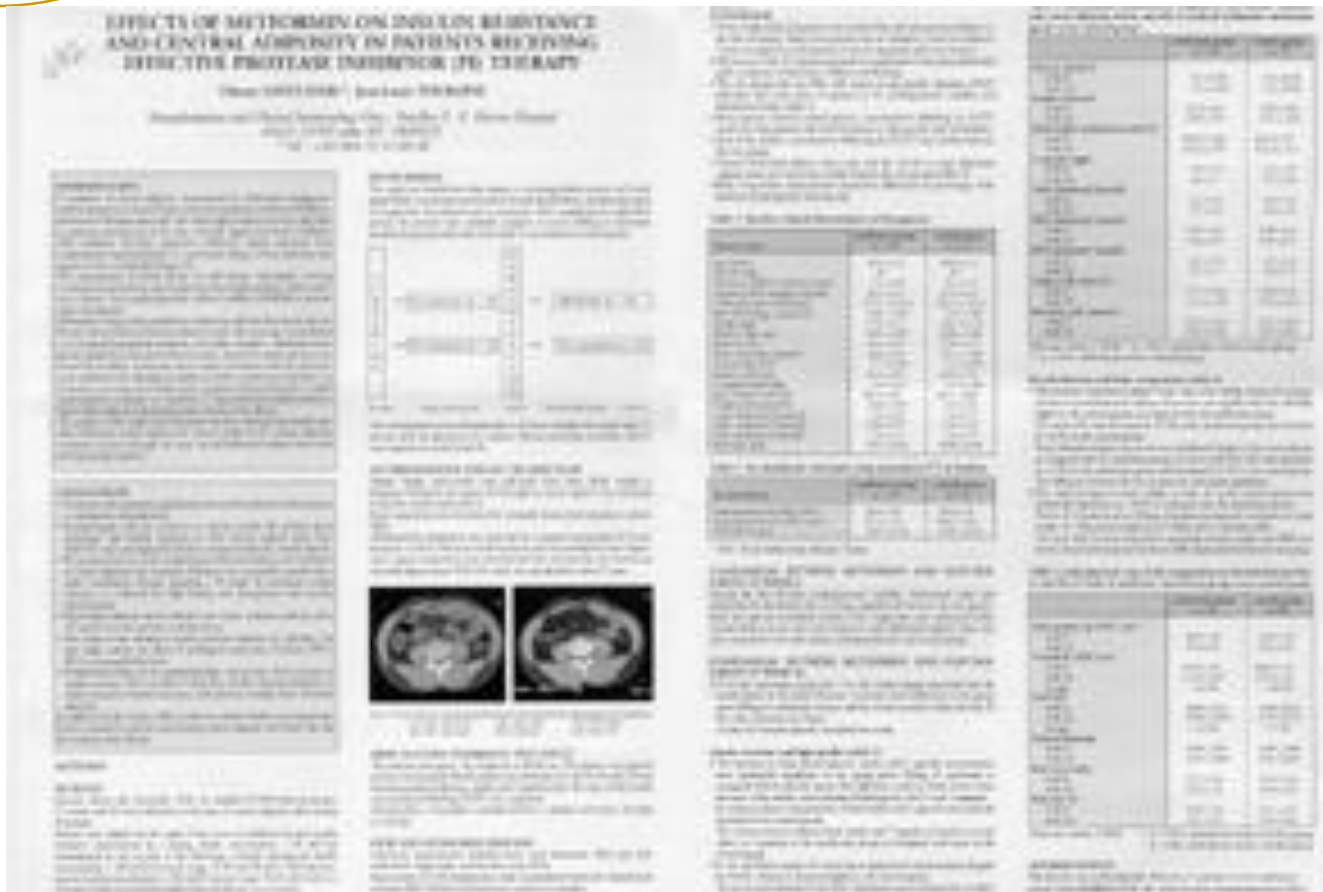


With Fillet: Vortices Reduced

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

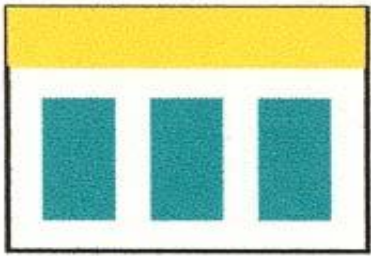
Posters should have more description than a talk slide, less description than a paper

(Way) too much description:



How to get started

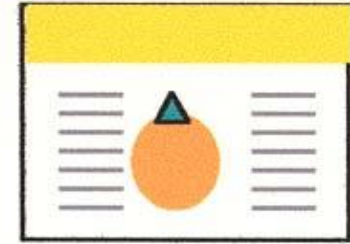
Choose a poster layout



vertical columns



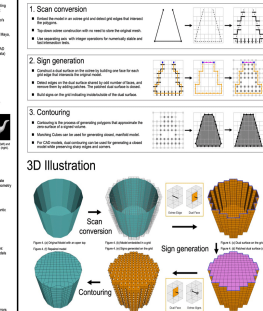
contrasting fields



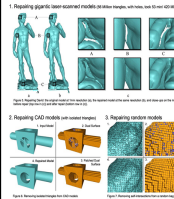
centered images w/ explanations

Robust Repair of Polygonal Models

Volumetric Approach



Examples



Highlights

- Robust: Does not require complex algorithms.
- Efficient: Uses sparse matrix-vector multiplication.
- Accurate: Repairs complex models.

Acknowledgements

This work was supported by the National Natural Science Foundation of China (Grant No. 61472100).

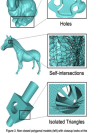
Polygonal Models



Closed Models



Model Repair



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

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

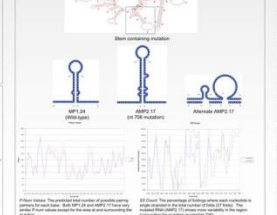
Abstract/Introduction

Coxsackievirus B1 (CBV1) is a non-enveloped RNA virus and a member of the Picornavirales family. Studies have shown that, while most cellular viruses, translation of picornavirus RNA is not cap-dependent. Translation initiation is mediated by an internal ribosome entry site (IRES) located in the 5' non-coding region. The IRES region and the surrounding 5'UTR are composed of RNA secondary structures which have shown to be important for the development of disease. Previous experimental work has shown that a single mutation at nucleotide 798, which is part of the IRES and near the nucleotide start site of nucleotide 742, changes the pathogenic phenotype of the virus in that it causes an acute infection but not development of disease. Previous experimental work has shown that a single mutation at nucleotide 798, which is part of the IRES and near the nucleotide start site of nucleotide 742, changes the pathogenic phenotype of the virus in that it causes an acute infection but not development of disease. Previous experimental work has shown that a single mutation at nucleotide 798, which is part of the IRES and near the nucleotide start site of nucleotide 742, changes the pathogenic phenotype of the virus in that it causes an acute infection but not development of disease.

Background/Methods

The sequence of the 66-742 region is highly variable among picornaviruses. However, secondary structure is generally conserved. Computational changes in the IRES may affect ribosome binding and scanning as well as binding of host cell factors involved in translation. An RNAi screen was used to predict the secondary structure of wild-type CBV1 (MP124) and a mutant (AMPT17) between nucleotides 1 and 742 (the non-coding region). Both sequences were folded on linear RNA at 37°C and the most conserved structures were assessed to see if they were conserved in the MP124 NCR and AMPT17 using RNAfold v1.1, which allows for a single-stranded RNA. Mutations were verified by primer extension and Sanger (AMPT17) analysis.

MP124 NCR Secondary Structure



Primer Extension Results

Primer extension experiments have provided insight into the secondary structure of the MP124 NCR. Positions where blue peaks are present (654, 660) show cleavage by RNase T1, indicating single-strandedness, while positions marked with red peaks show no cleavage by RNase T1, indicating that the RNA is double-stranded. Red peaks are the NCR-500 sequence.

Conclusions

- The secondary structure of MP124, especially near nucleotide 798, appears to be more stable than AMPT17.
- Other thermodynamic data (MP124 v1.1) predicted an increased stem length (nucleotides 661 to 720) in AMPT17 from thermodynamic data (MP124 v1.1) predicts a different structure and places the mutation in a single-stranded region rather than a stem.
- The C-U transition at nucleotide 798 most likely causes a change in the secondary structure of CBV1.
- Primer extension data obtained thus far support the predicted structure for the secondary structure of CBV1.
- Further analysis will verify whether the nucleotide 798 mutation alters NCR structure, providing an important link between NCR structure and pathogenicity of CBV1.

References

- Schulz, W. L. et al. (2014) A single mutation at nucleotide 798 and nucleotide position 742 in the 5' non-coding region of Coxsackievirus B1 (CBV1) is highly conserved among picornaviruses. *Journal of Virology*, 88(11), 6264-6270.
- AMPT17, created by Dr. Michael Zuber, was used to predict the secondary structure of wild-type CBV1 (MP124) and a mutant (AMPT17) between nucleotides 1 and 742 (the non-coding region).
- Both sequences were folded on linear RNA at 37°C and the most conserved structures were assessed to see if they were conserved in the MP124 NCR and AMPT17 using RNAfold v1.1, which allows for a single-stranded RNA. Mutations were verified by primer extension and Sanger (AMPT17) analysis.

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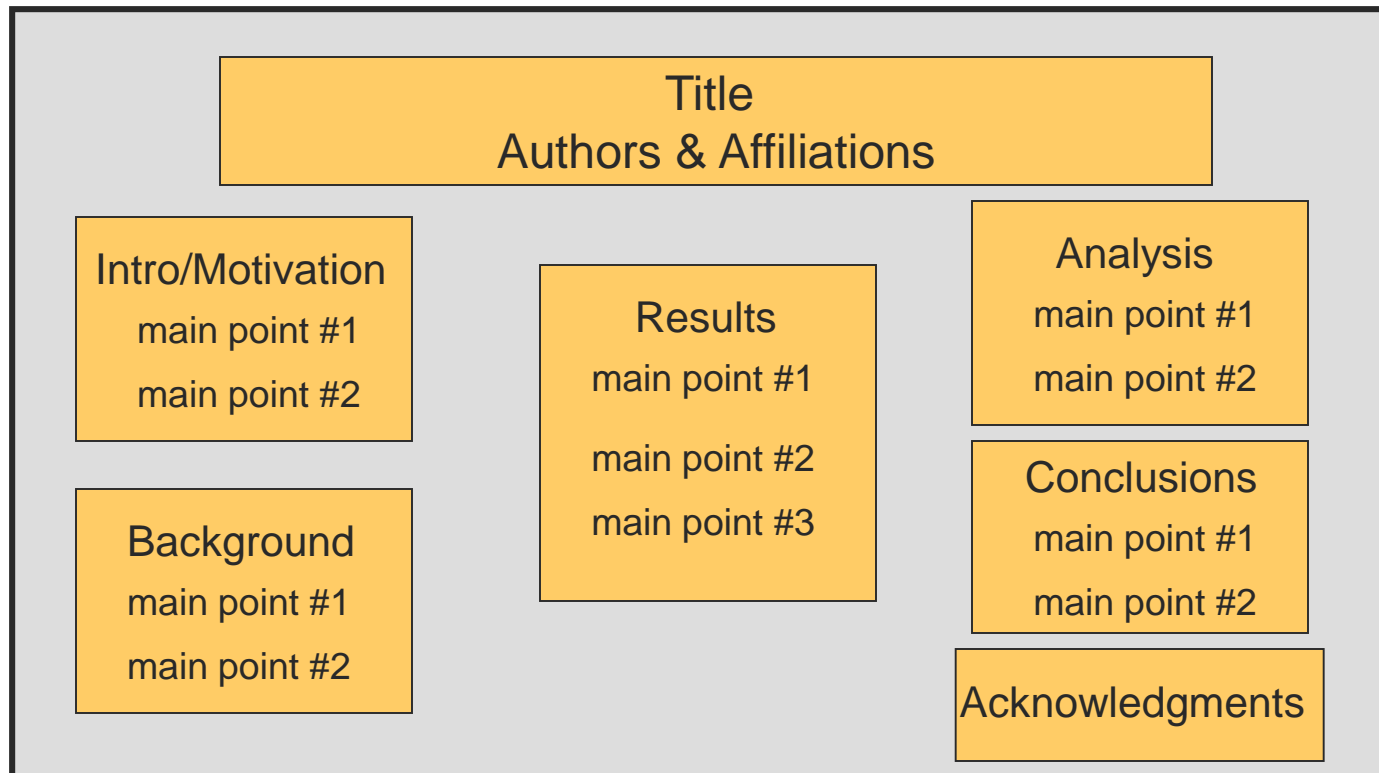
This work was supported by the National Natural Science Foundation of China (Grant No. 61472100).

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

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



Pauli Blocking



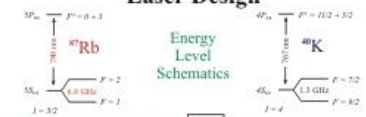
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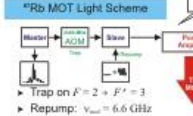
The $^{87}\text{Rb} - ^{40}\text{K}$ System

- 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 $T_c \rightarrow$ greater degeneracy (?)
- New physics – isotope effects in ultracold collisions, phase separation, collective excitations, BEC/FG impurity studies, phonon exchange, Feshbach resonances (?), ...

Laser Design

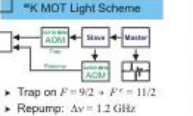


^{87}Rb MOT Light Scheme



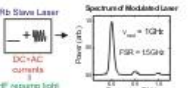
Trap on $F=2 \rightarrow F'=3$
Repump: $\nu_{\text{repump}} = 6.6$ GHz

^{40}K MOT Light Scheme

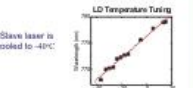


Trap on $F=9/2 \rightarrow F'=11/2$
Repump: $\Delta\nu = 1.2$ GHz

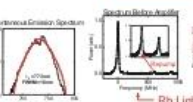
Laser Diode Current Modulation



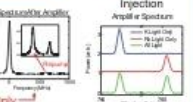
Temperature Tuning to 767 nm




Power Amplifier



Four-Color Injection Amplifier Spectrum

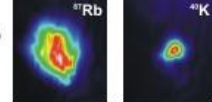


Two-Species MOT



- 3-beam (retroreflected) MOT
- Up to ~300 mW total power
- 3 cm diameter beam waist
- 13 G/cm field gradient

(Single-Species) Fluorescence Images

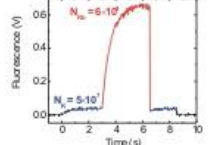


$N_{^{87}\text{Rb}} = 2 \times 10^7$
 $w_{^{87}\text{Rb}} \sim 2$ mm

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

Two-Species Fill Curve:

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



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

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

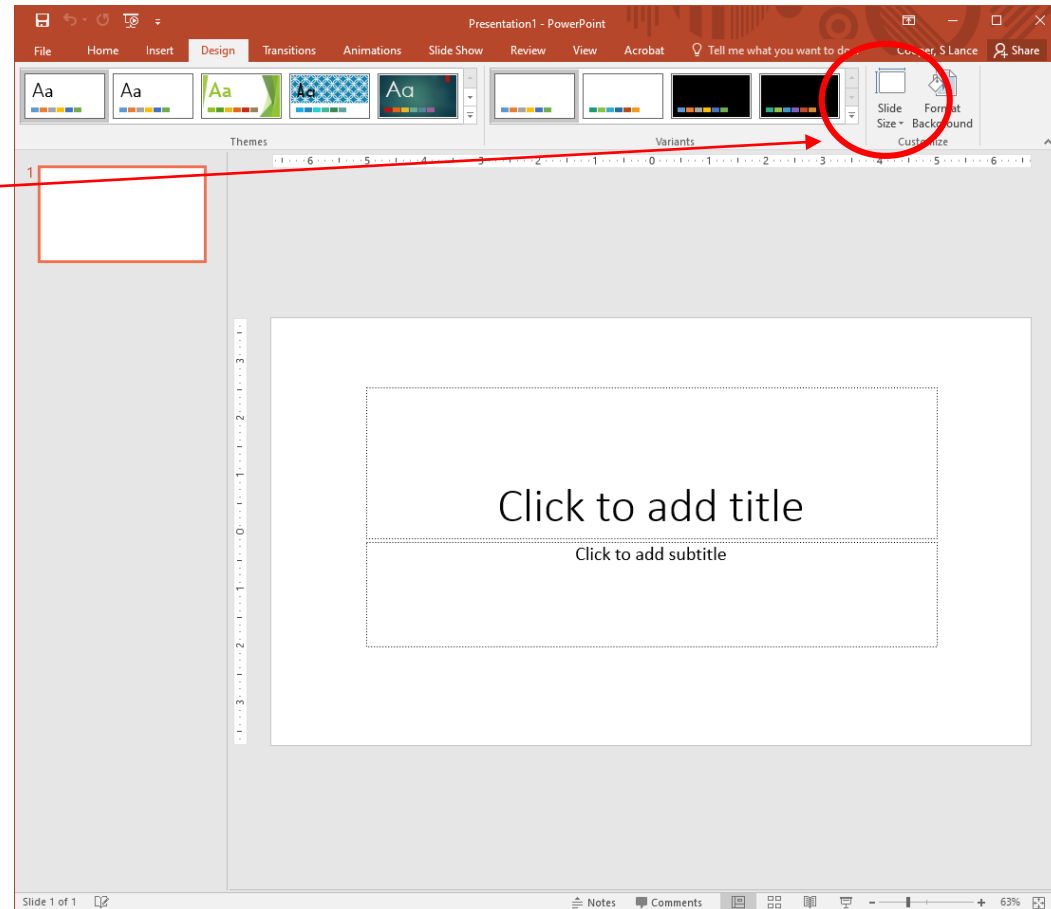
Height of slides: 28 inches

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

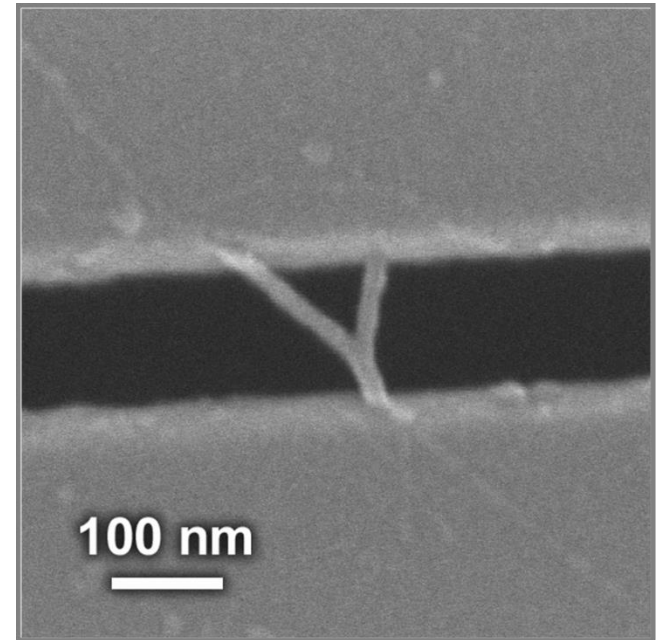
Make sure to label all figures with legible fonts and font sizes

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

Make sure your images and figures have 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 a 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.

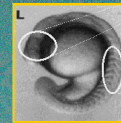


Figure 2: Expression of the CDC25 in the Primary Motor Neurons at the Terminal Mitosis Stage.

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 slegria@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

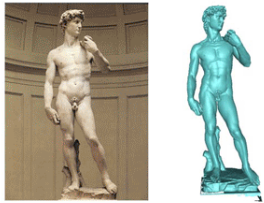


Figure 1. The statue of David by Michelangelo in the Galleria dell'Accademia in Florence (left), and the polygonal model reconstructed from laser range scans (right).

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

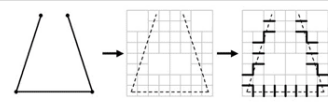
What has been done?

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

Volumetric Approach

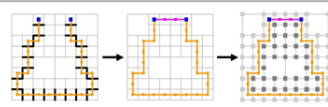
1. Scan conversion

- 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.



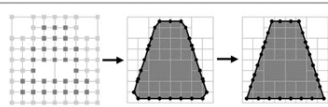
2. Sign generation

- 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

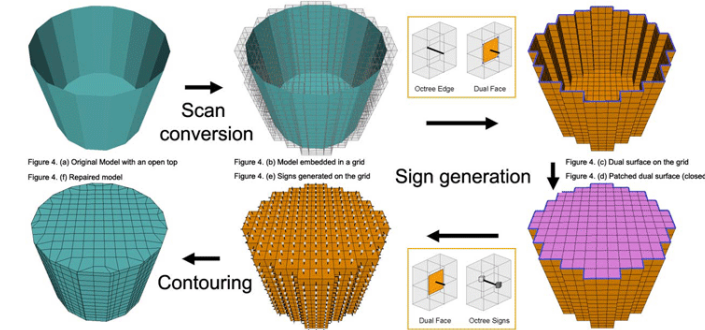


Figure 4. (a) Original Model with an open top

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)

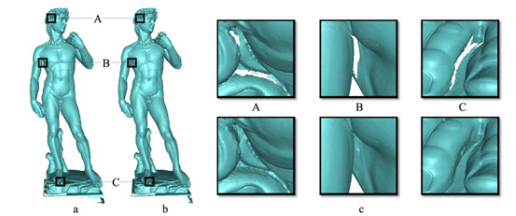


Figure 5. Repairing David: the original model at 1mm resolution (a), the repaired model at the same resolution (b), and close-ups on the model before repair (top row in (c)) and after repair (bottom row in (c)).

2. Repairing CAD models (with isolated triangles)

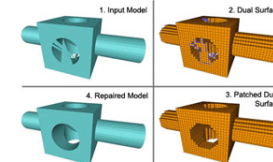


Figure 6. Removing isolated triangles from CAD models

3. Repairing random models

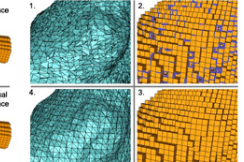


Figure 7. Removing self-intersections from a random bag of polygons

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	1,087,716	1024	1.3 min	28 MB
David (2mm)	8,254,150	4096	6.4 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
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The Question of REINTEGRATION

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



The prostitute Nancy from *Clara* (1841)



Queen Victoria, model 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

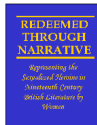


In her study *Fallenness in Victorian Women's Writing*, Deborah Anna Logan contends that **most fictional fallen women were never fully reintegrated into society.**

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 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 fate 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 houses, 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 Convict-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 Two 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 *County Down* (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.



Christa College, the shelter run by Dickens

Critique these posters:

VITAMIN C: THE MULTIFUNCTIONAL ANTIOXIDANT

Rice University

BACKGROUND

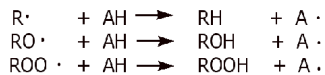
Vitamin C (Ascorbic Acid) is an essential nutrient discovered in 1932 by Albert Szent-Györgyi, who isolated the antiscorbutic factor as pure crystalline material from lemon juice. In the past 25 years, much of the vitamin's biochemical functions have been elucidated, including vitamin C to the treatment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

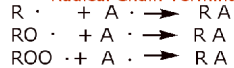
- Stability of antioxidant free radicals
- Resonance delocalization
- Further oxidation of antioxidant radicals
- Reduction of radical species

REACTION MECHANISMS

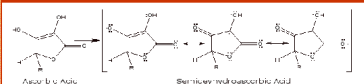
Antioxidant Radical Formation



Radical Chain Termination

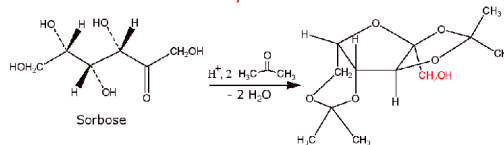


ANTIOXIDANT RADICAL STABILITY

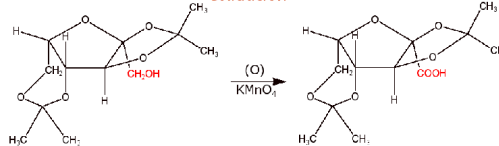


ORGANIC SYNTHESIS OF VITAMIN C

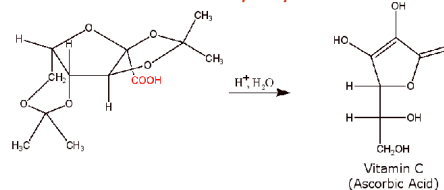
Acid Catalyzed Acetalization



Oxidation



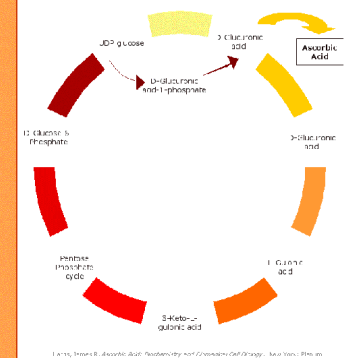
Acid Hydrolysis



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

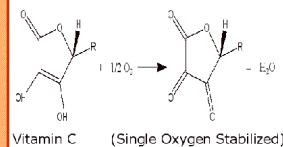
Antioxidant

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

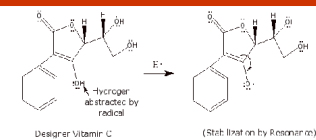
Prooxidant

- Reduction of Fe³⁺ to Fe²⁺

OXYGEN SCAVENGER



DESIGNER VITAMIN C



Critique these posters:

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!

Topological regions

Signal map

Location estimate $\vec{\pi}_i$

$P(o_j | s_i)$

Observed signal strength \vec{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.

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

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