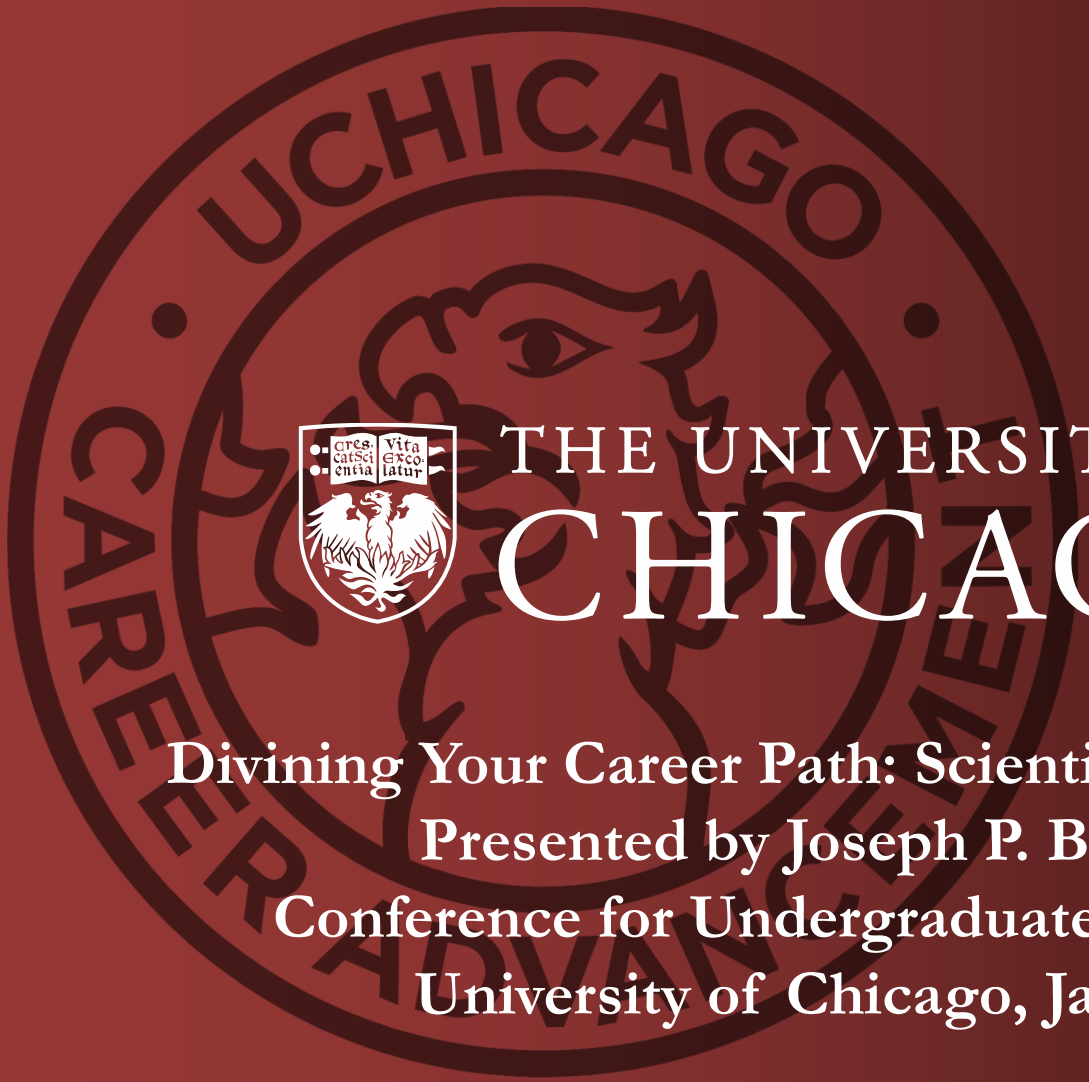



THE UNIVERSITY OF CHICAGO | Career Advancement

# Divining Your Career Path: Scientific Career Destinations

Presented by Joseph P. Bernstein, PhD

Conference for Undergraduate Women in Physics

University of Chicago, January 19, 2014

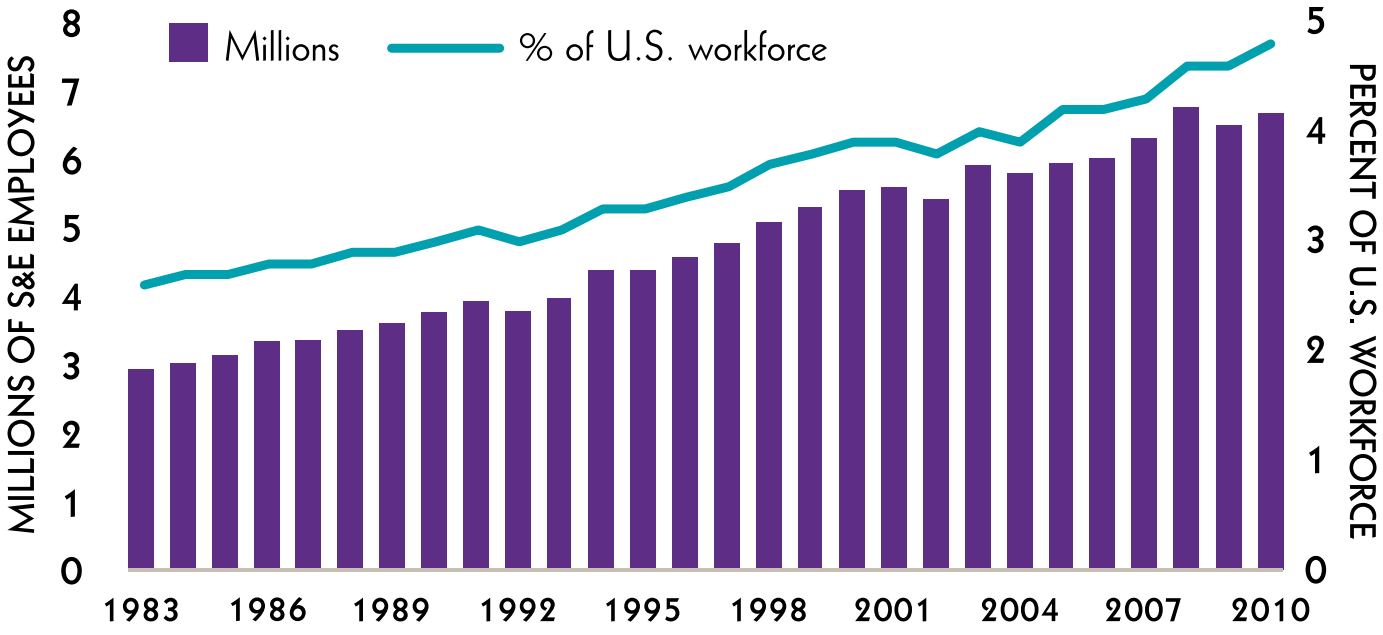
# Presentation Outline

- Determining Strategy: National Employment Trends
- Case Study: Impact of Physics Degrees
- Tactics: Getting Out There, Job Search Toolkit, Networking
- Example: One Person's Career Path

# The View From 30,000 Feet (or 9144 Meters)

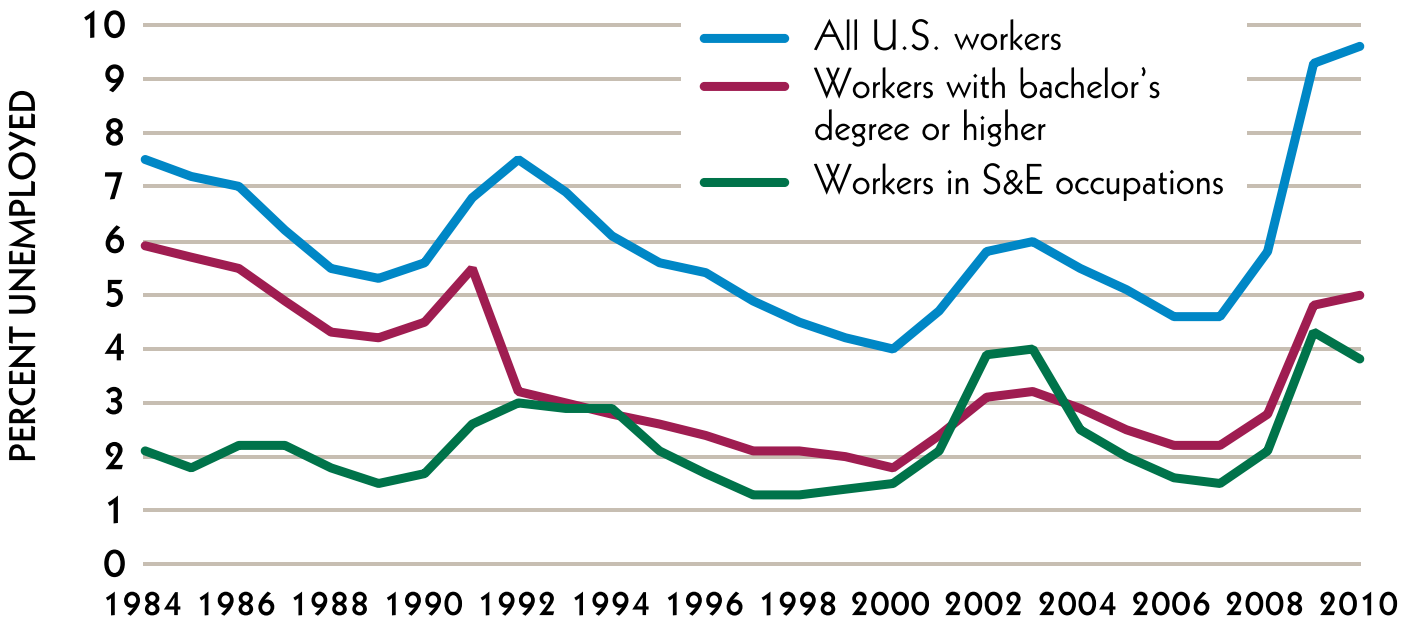
## Determining Strategy: Science & Engineering Employment Trends

# An Important Employment Sector Minority



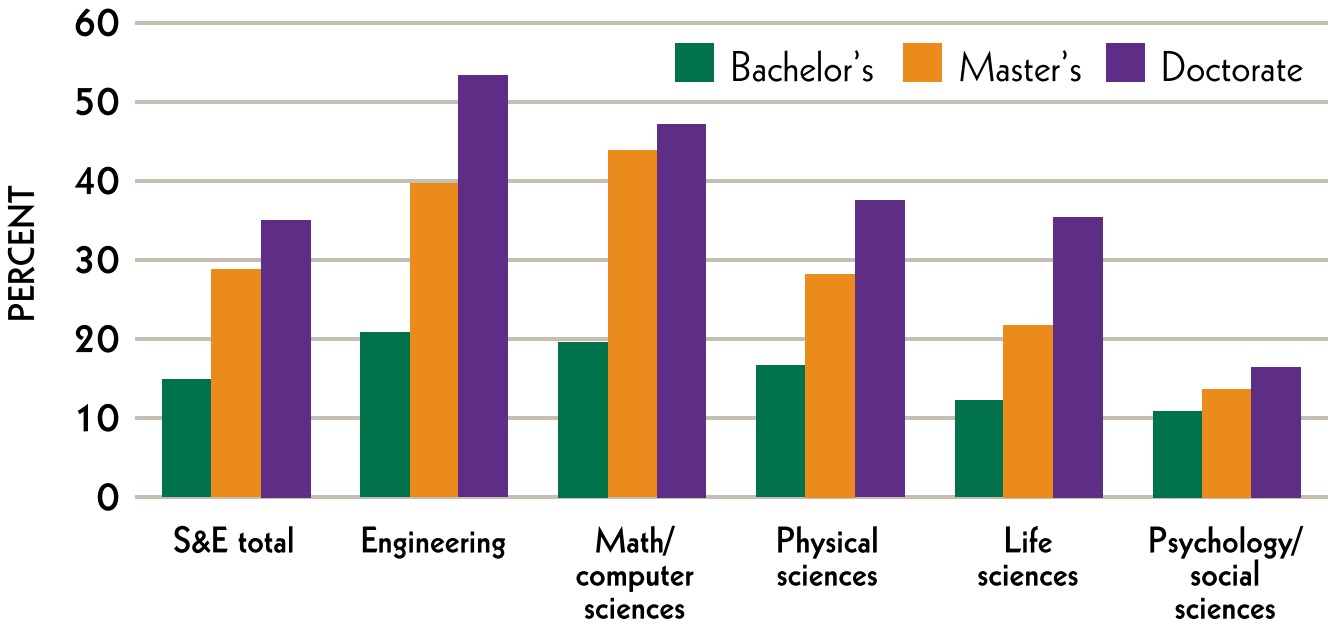

*SEI 2012*: **Size of the S&E Workforce**, Chapter 3.

# Unemployment Protection




*SEI 2012*: **Unemployment in the S&E Labor Force**, Chapter 3.

# Importance of International Talent




*SEI 2012*: **S&E Immigrants**, Chapter 3.

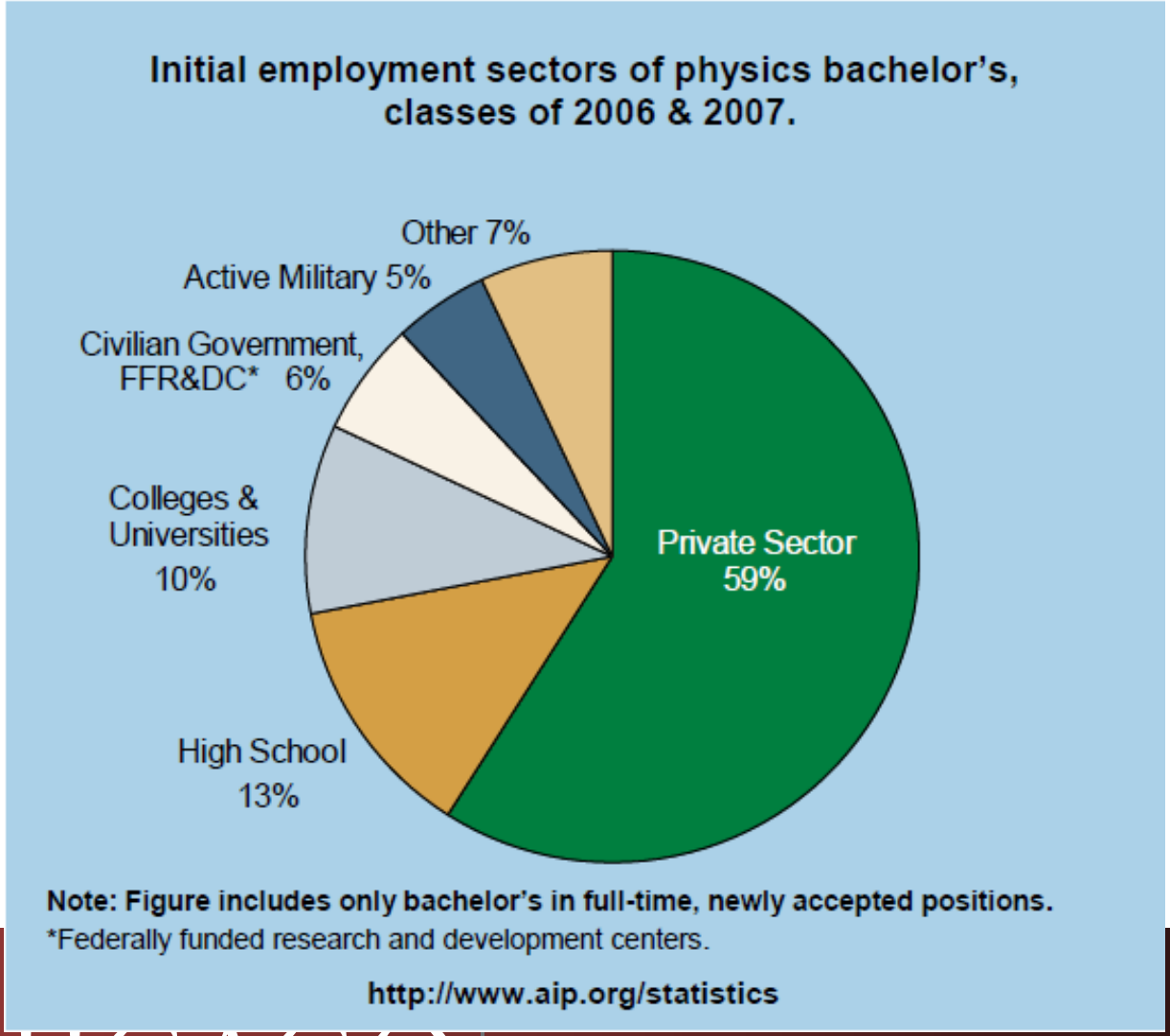
# Underrepresentation: Painfully Slow Progress


*SEI 2012*: **Demographics of the S&E Workforce**, Chapter 3.

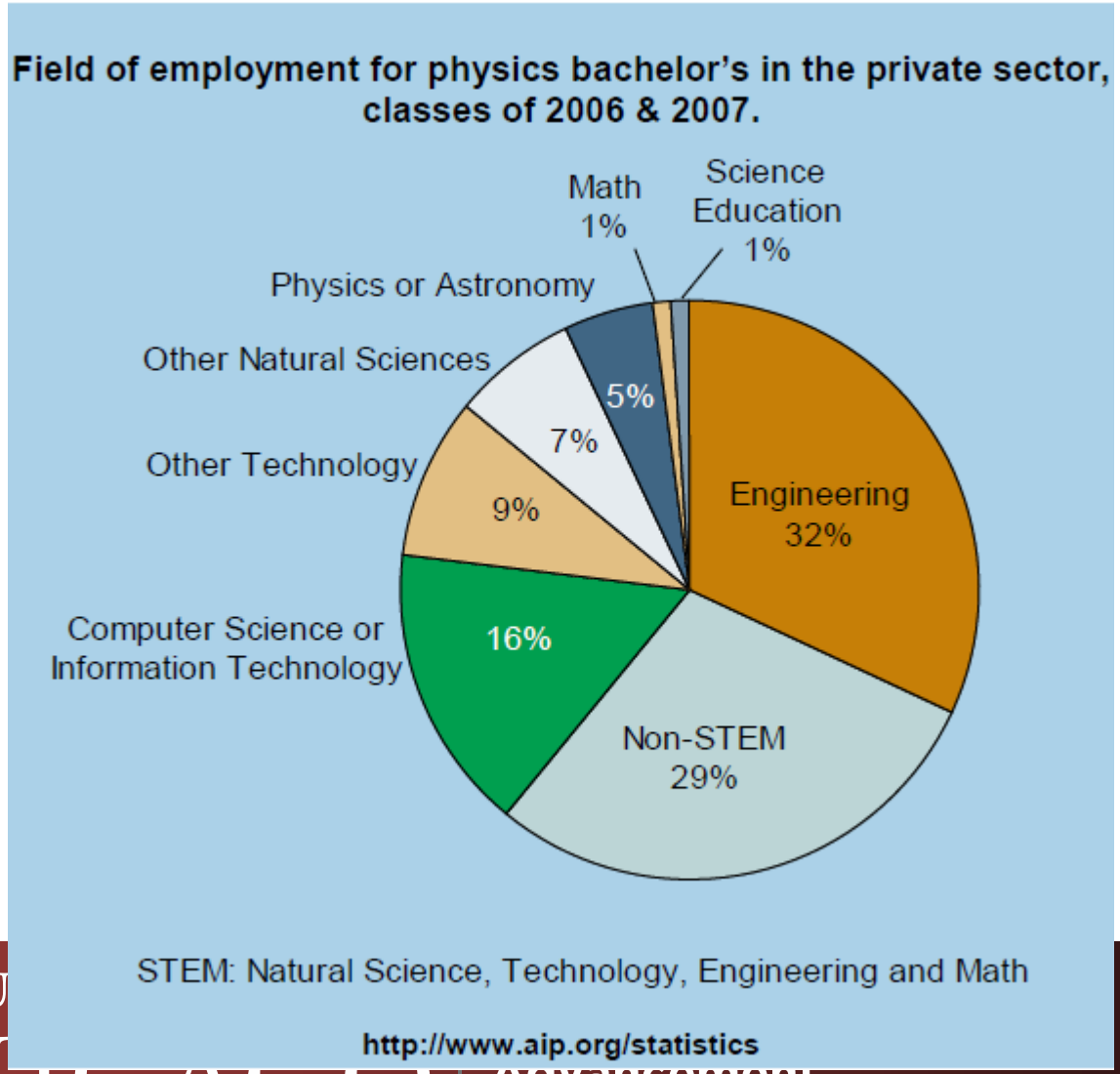
# The View From 10,000 Feet (or 3048 Meters)

## A Case Study: The Impact of Physics Degrees

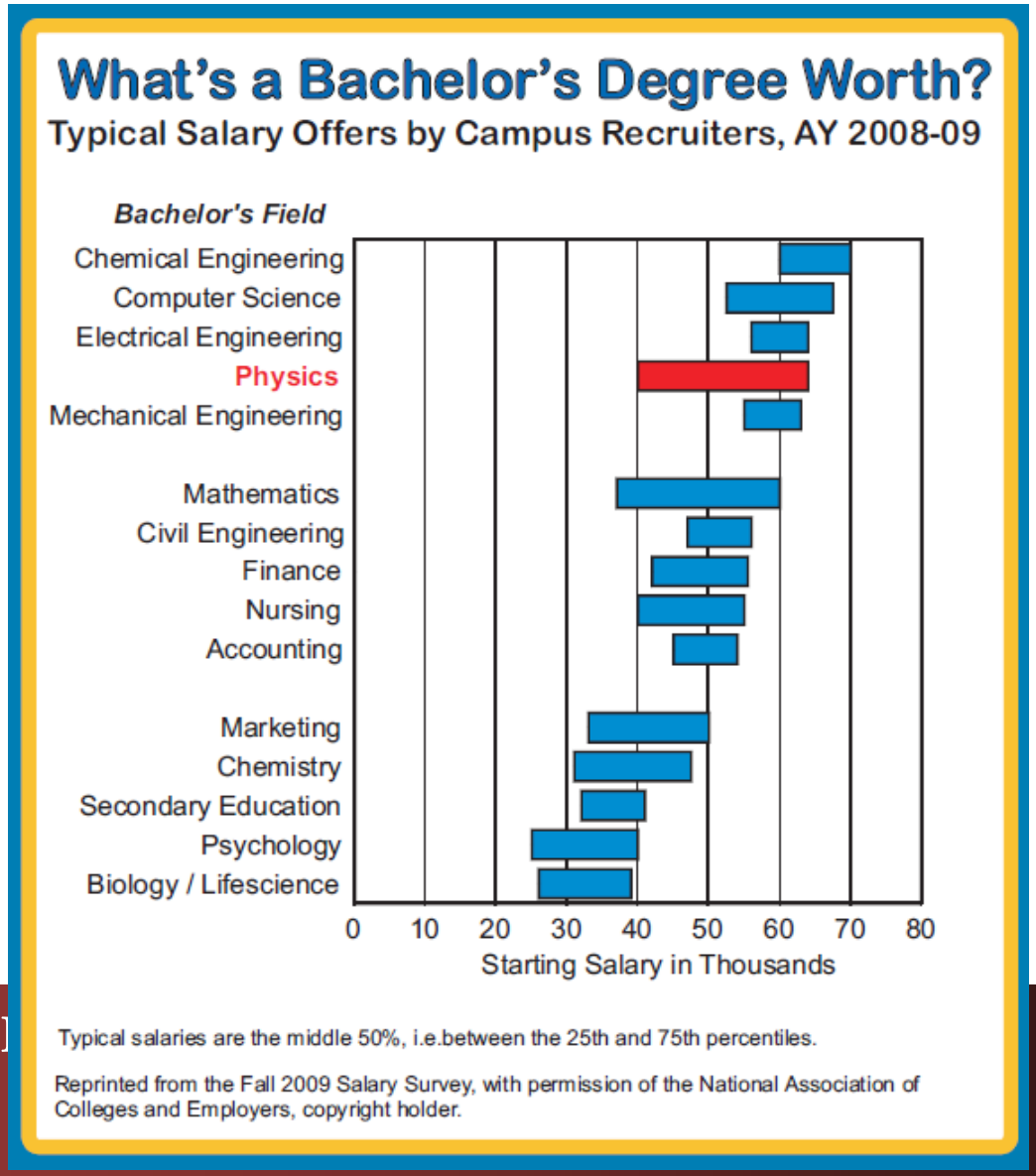
# Initial Employment: Physics Bachelor's



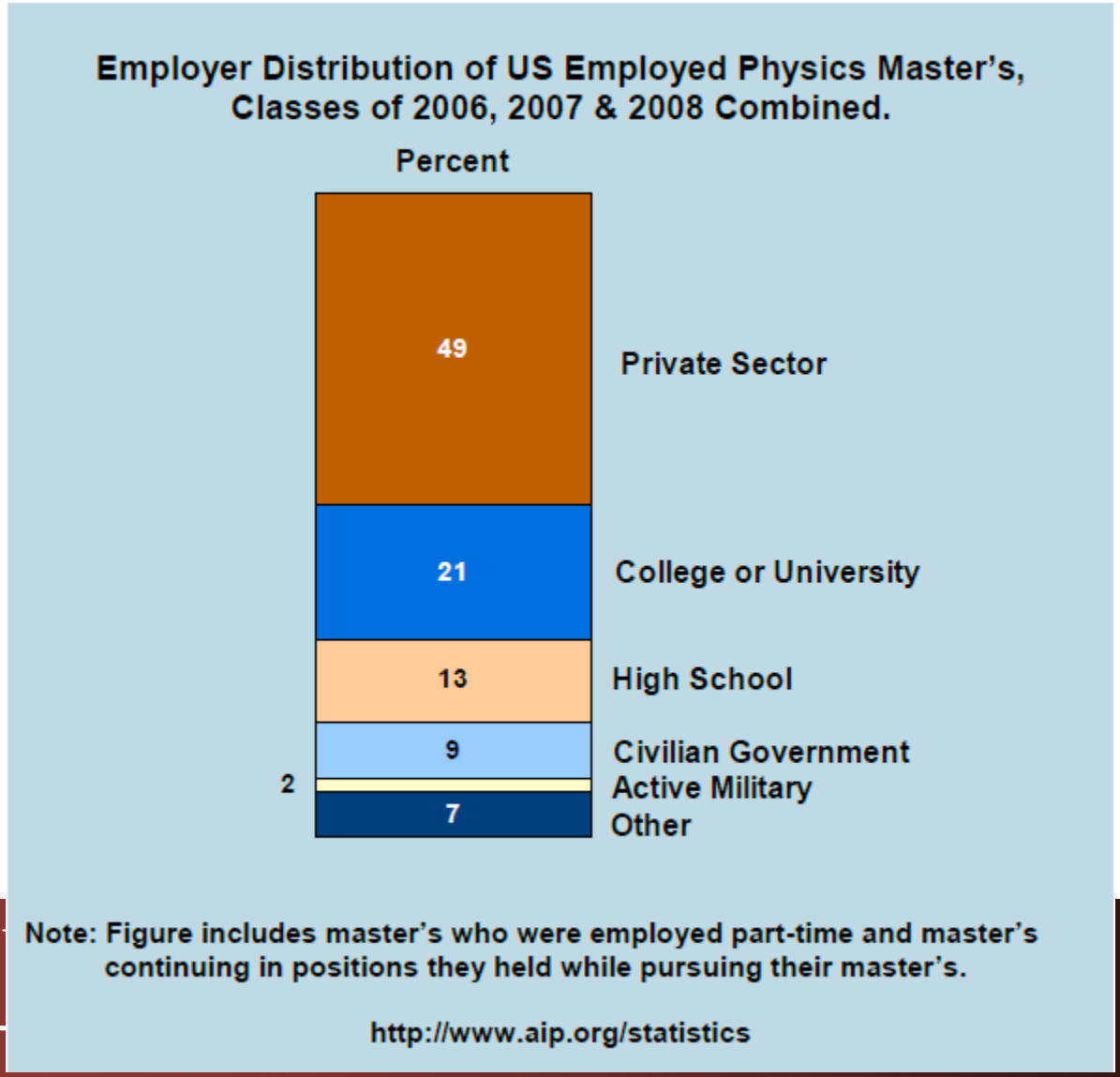
# Private Sector Employment: Physics Bachelor's



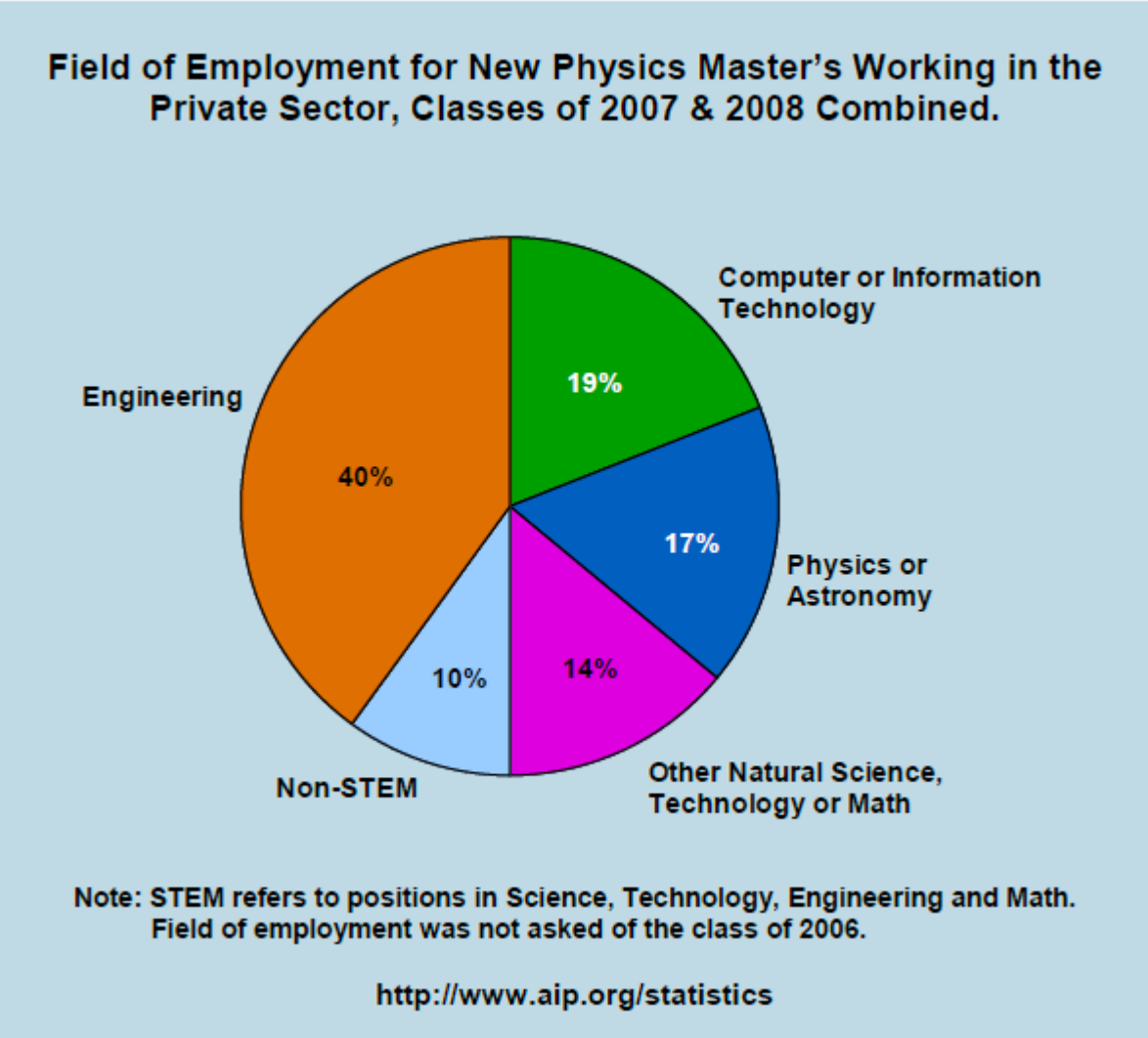
# Typical Starting Salaries: Bachelor's



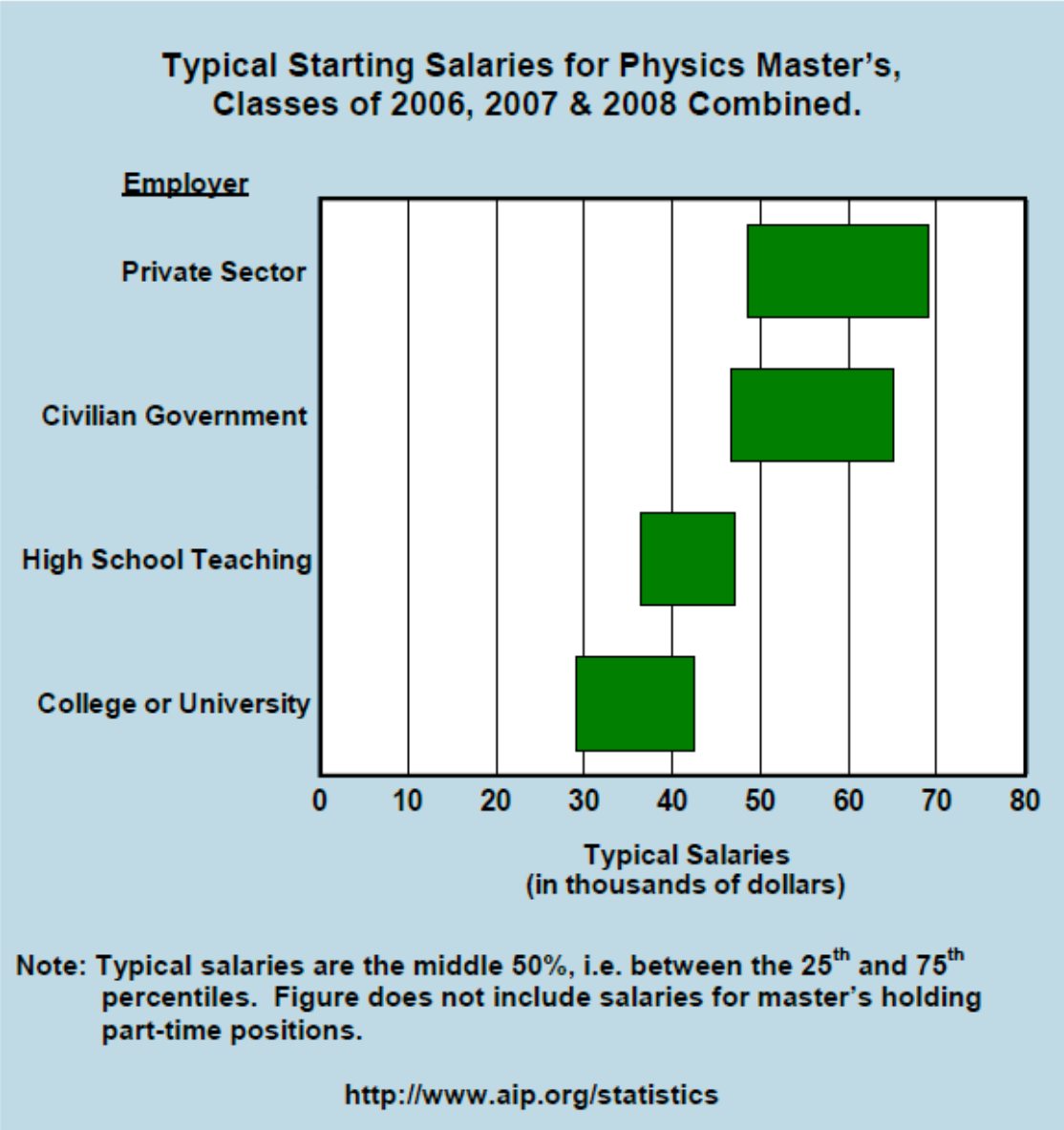
# Initial Employment: Physics Master's



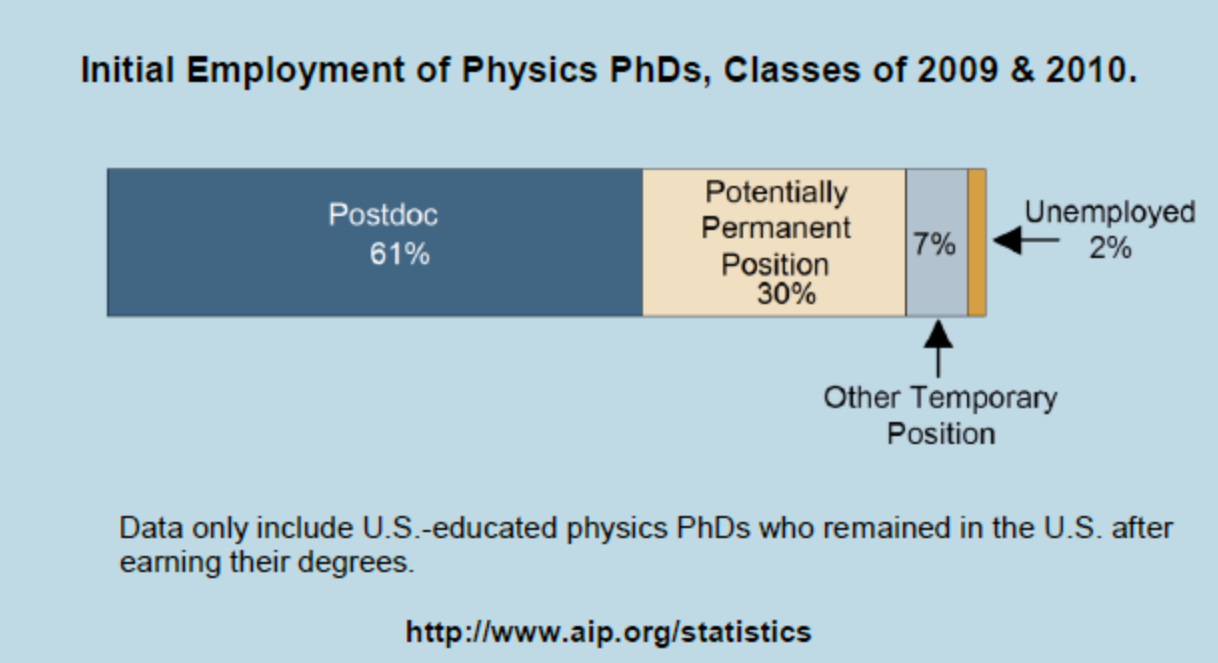
# Private Sector Employment: Physics Master's



# Typical Starting Salaries: Physics Master's



# Initial Employment: Physics PhDs



# Employment Type: Physics PhDs

**Types of Positions Accepted by Employment Sector, Classes of 2009 & 2010.**

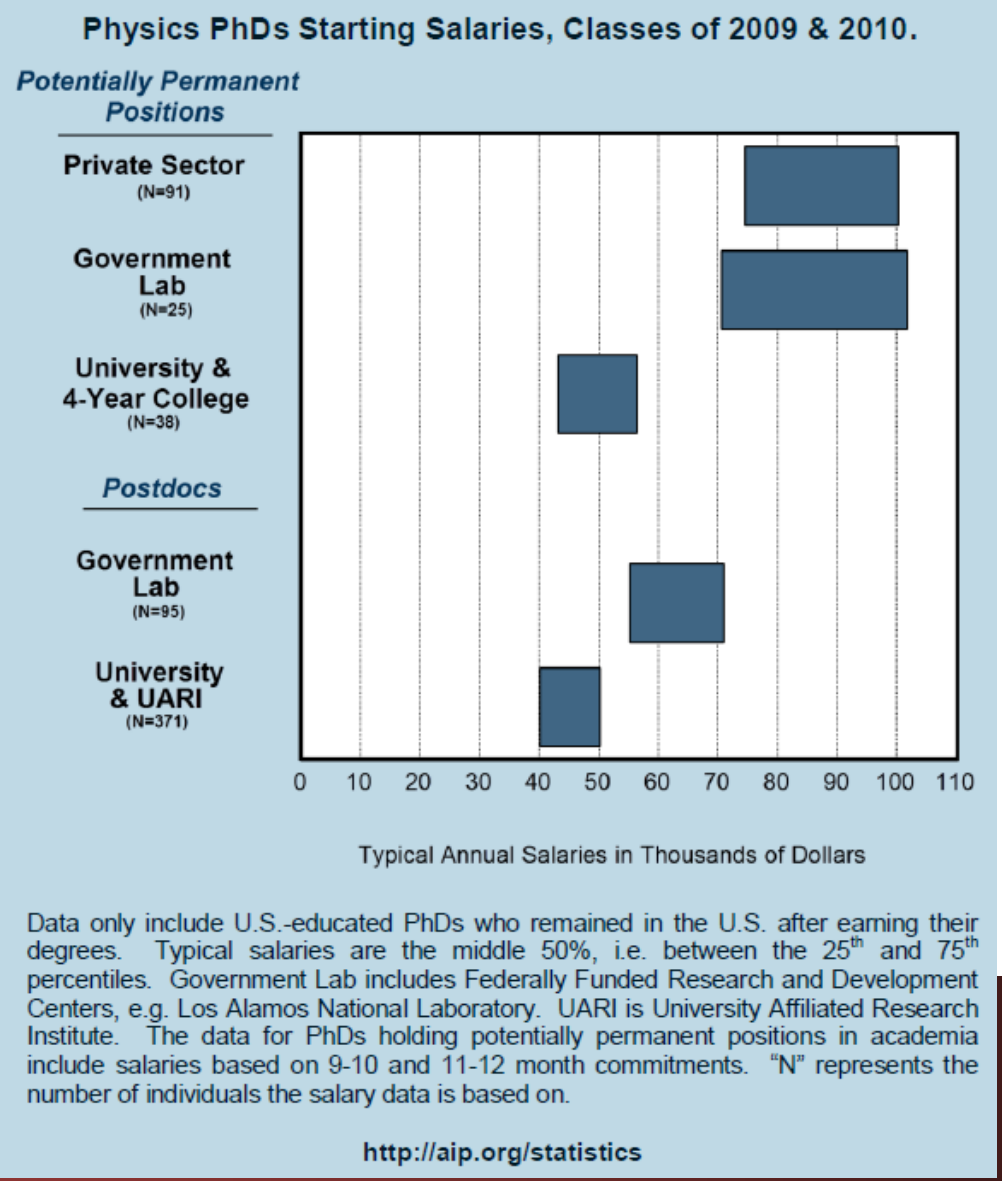
| | Postdoc % | Potentially Permanent % | Other Temporary % | Overall % |
|---|---|---|---|---|
| Academic* | 73 | 23 | 82 | 58 |
| Private sector | 1 | 57 | 9 | 19 |
| Government | 22 | 16 | 6 | 19 |
| Other | 4 | 4 | 3 | 4 |
| N | 740 | 365 | 89 | 1,194 |

Data only include U.S.-educated physics PhDs who remained in the U.S. after earning their degrees.

*Includes university affiliated research institutes.

**http://www.aip.org/statistics**

# Typical Starting Salaries: Physics PhDs



# The View From 1,500 Feet (or 457.2 Meters)

## Tactics: Getting Out There, Job Search Toolkit, Network

# Thinking Beyond School: Now What?

## Getting Out There

| Experience | Examples |
|---|---|
| **Internships**<br>Full or part-time work spanning a number of weeks | Research Experiences for Undergraduates (REU)<br>Science Undergraduate Laboratory Internships (SULI)<br>Research assistantships with local faculty<br>Formal, programmatic assignment via local career office<br>Ad hoc opportunity found by student (see Networking)<br>Ad hoc opportunity found by faculty or family |
| **Externships**<br>Full or part-time job shadowing for, e.g., 1-3 days or 1 half-day per week for a number of weeks | Formal, programmatic assignment via local career office<br>Ad hoc opportunity found by student (see Networking)<br>Ad hoc opportunity found by faculty or family |
| **Campus or employer visits**<br>Trips to other institutions or employers to meet with other students/professors or working professionals | Formal, programmatic assignment via local career office<br>Formal opportunity organized by , e.g., student group<br>Ad hoc opportunity found by faculty or student(s) |

# Thinking Beyond School: Now What?

## Job Search Toolkit

| Item | Description |
|---|---|
| Career exploration outcomes | Possible career tracks identified<br>Leverage Informational Interviewing |
| Customizable master resume | Contains all possible resume entries (private; never given out) |
| Generic one-page resume | Showcases widely applicable experience and skills (submitted in pinch if no time to customize) |
| Master cover letter text repository | Contains example paragraphs describing experience and skills (serves as basis for job applications) |
| Research-focused CV | Lists all academic experience (submit with applications for research positions, research funding, etc.) |
| Teaching-focused CV | Lists all academic experience (submit with applications for teaching positions, pedagogy funding, etc.) |
| Master research and teaching statement repository | Contains example paragraphs describing experience and plans (serves as basis for job applications) |

# Thinking Beyond School: Now What?

## Example Networking Activities

| Activity | Description |
|---|---|
| Attend College/University colloquia, seminars, etc. | Ask questions during and engage in discussions before/after; don't limit to home department |
| Attend College/University professional development/career events | Actively engage and talk with as many people as possible (attendees, presenters, organizers) |
| Sign-up for and build-out a LinkedIn profile | Widely connect both within and beyond home institution, prioritize building a diverse network, join and participate in groups, regularly post links (etc.) and respond to other posts (75% of jobs come from 2nd Level) |
| Sign-up for and build-out a Research Gate profile | Widely connect both within and beyond home institution, prioritize building a diverse network, regularly post links (etc.) and respond to other posts |
| Join Meetup groups and regularly attend events – if no area group , start one! | Actively engage and talk with as many people as possible (attendees, presenters, organizers) |
| Seek out other opportunities. . . | |

# Thinking Beyond School: Now What?

## Example Job Opportunity Sources Across the Spectrum of Careers

| Sector | Example Sources |
|---|---|
| Academia | AAAS Science Careers<br>American Astronomical Society Job Register<br>American Geophysical Union Career Center<br>Physics Today Jobs<br>ScienceJobs.org |
| Government | GovernmentJobs.com<br>GovtJobs.com<br>OPM.gov<br>USAJobs.gov |
| Industry | CareerBuilder.com<br>Indeed.com<br>SimplyHired.com |
| Non Profit | Idealist.org<br>NPO.net<br>TheNonProfitTimes.com |
| Sector Crossing | LinkedIn.com |

# A View From The Ground (or 0 Meters)

## Example: One Person's Career Story

# A Winding Road With Many Interesting Stops

- BA in Physics (1996, U. Chicago): with a thesis in condensed matter physics
- MS in Physics (1998, U. Kentucky): with a thesis in astrophysics
- Adjunct Professor of Astronomy (AY1999, Bluegrass Community & Technical College)
- PhD in Astronomy & Astrophysics (2008, U. Michigan; MS 2002; included college astronomy teaching): with a dissertation on winds from dead stars
- Postdoctoral scholar (09/2007 – 07/2012, Argonne National Lab, plus more adjunct teaching): worked on supernovae, dark energy, and high performance computing
- Communications Lead (07/2012 – 07/2013, Argonne National Lab): worked on strategic communications and internal programs for the Physical Sciences & Engineering Directorate
- Associate Director (09/2013 – present, U. Chicago): Manage the Career Advancement Graduate Services Team and serve as dedicated Liaison to the Physical Sciences Division and in training to be a Sexual Assault Dean on Call

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Office of Science U.S. DEPARTMENT OF ENERGY

A U.S. Department of Energy laboratory managed by UChicago Argonne, LLC

# *The Fate of the Universe and the Mystery of Dark Energy*

Dr. Joseph P. Bernstein

Talk to Joe the Astronomer Program
High Energy Physics Division
Argonne National Lab, Lemont, IL U.S.A.

Forum Astronomy Discussion – October 13, 2009

Old Orchard Junior High School, Skokie, IL

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Office of Science U.S. DEPARTMENT OF ENERGY

A U.S. Department of Energy laboratory managed by UChicago Argonne, LLC

# A Discussion of *"Chimpanzee and human Y chromosomes are remarkably divergent in structure and gene content"* **doi:10.1038/nature08700**

**Jennifer F. Hughes**[1], Helen Skaletsky[1], Tatyana Pyntikova[1], Tina A. Graves[2], Saskia K. M. van Daalen[3], Patrick J. Minx[2], Robert S. Fulton[2], Sean D. McGrath[2], Devin P. Locke[2], Cynthia Friedman[4], Barbara J. Trask[4], Elaine R. Mardis[2], Wesley C. Warren[2], Sjoerd Repping[3], Steve Rozen[1], Richard K. Wilson[2], David C. Page[1]

[1]Howard Hughes Medical Institute, Whitehead Institute, and Department of Biology, Massachusetts Institute of Technology; [2]The Genome Center, Washington University School of Medicine; [3]Center for Reproductive Medicine, Department of Obstetrics and Gynecology, Academic Medical Center; [4]Division of Human Biology, Fred Hutchinson Cancer Research Center

J. P. Bernstein
High Energy Physics Division
Argonne National Laboratory

Journal Club Meeting
January 22, 2010
Argonne National Laboratory

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Office of Science U.S. DEPARTMENT OF ENERGY

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# *The Fate of the Universe and the Mystery of Dark Energy*

Dr. Joseph P. Bernstein

Talk to Joe the Astronomer Program
High Energy Physics Division
Argonne National Lab, Lemont, IL U.S.A.

1st Annual "Bring Your Child to Work" Day – April 23, 2010
High Energy Physics Division, Argonne National Lab

# Leveraging High Performance Computing in the Pursuit of Real-world Nuclear Energy Solutions

Joseph P. Bernstein
High Energy Physics Division
Leadership Computing Facility
Argonne National Laboratory
Lemont, IL U.S.A

With input from Prof. Clifford E. Singer (University of Illinois)

22nd International Summer Symposium on Science and World Affairs
July 9-16, 2010 Hamburg, Germany

# Tricky Harbors & Leaky Boats: What Science & Engineering Women Face

## A Discussion of the report "To Recruit and Advance: Women Students and Faculty in U.S. Science and Engineering" from the National Research Council

**Joseph P. Bernstein**

High Energy Physics Division

Leadership Computing Facility

Argonne National Laboratory

Journal Club

Argonne National Lab

Jan. 18, 2012

# A Winding Road With Many Interesting Stops

- BA in Physics (1996, U. Chicago): with a thesis in condensed matter physics
- MS in Physics (1998, U. Kentucky): with a thesis in astrophysics
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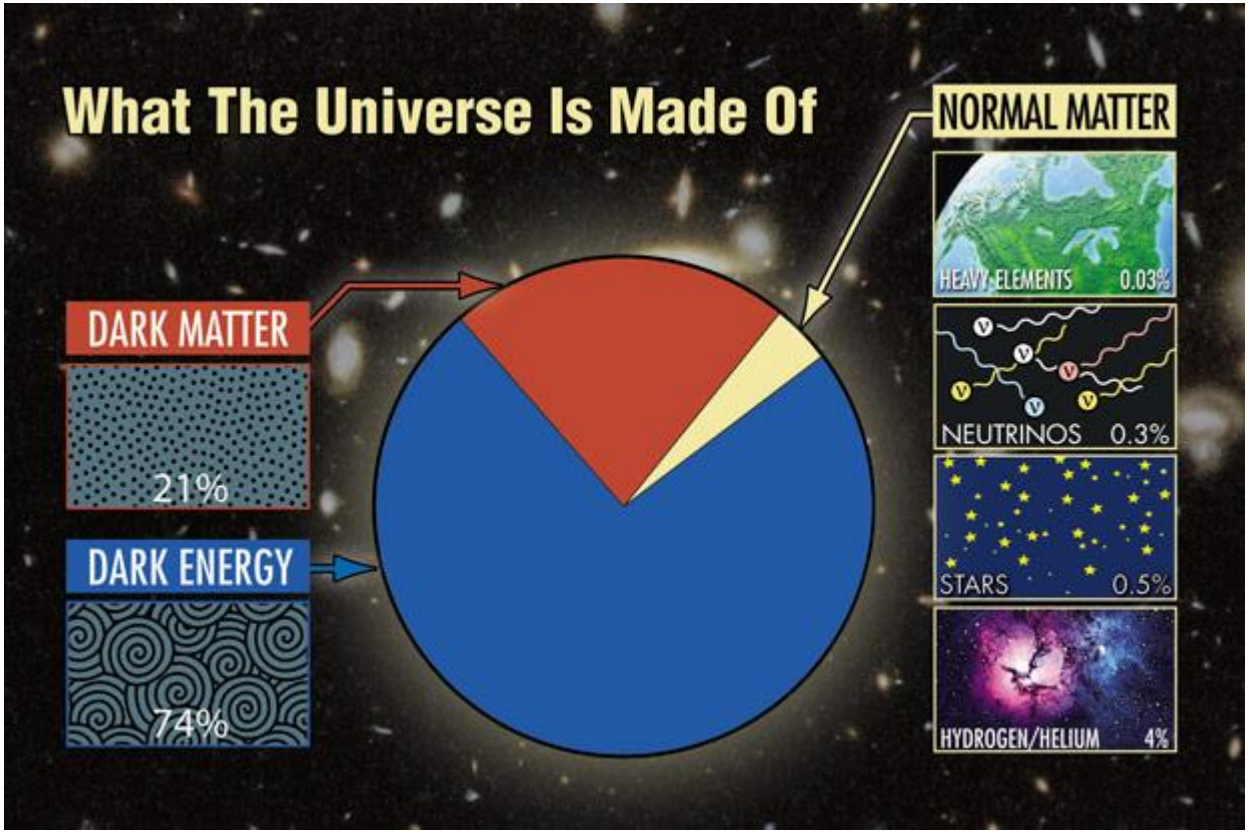
# Fundamental Motivation




Courtesy: http://hetdex.org

# Discovery of Dark Energy
# Type Ia Supernovae: Standard Candles

Distant supernovae dimmer than predicted for a matter-only Universe! (originally discovered in 1998)

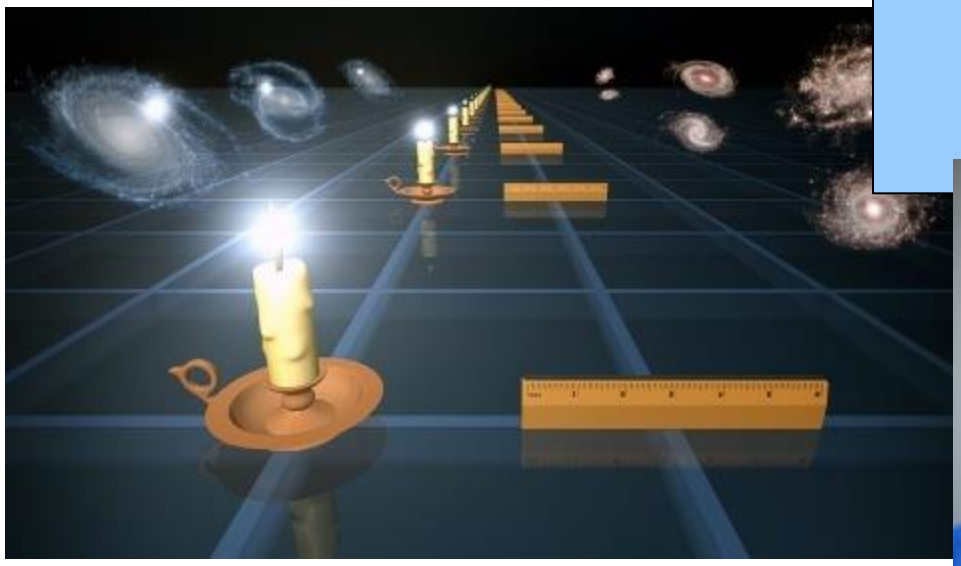


Image courtesy http://www.insidescience.org



The Nobel Prize in Physics 2011
Saul Perlmutter, Brian P. Schmidt, Adam G. Riess




Source: http://blogs.discovermagazine.com

# Quantitative Framework for Dark Energy

Explanation: expansion of Universe is accelerating due to dark energy that has strongly ***negative*** pressure ($p_{DE}$)

Just one problem: "best" current model predicting the amount of dark energy is off by as much as a factor of $10^{60}$ = 1000000000000000000000000000000000000000000000000000000000000

# Dark Energy Survey (DES)

DES is surveying a large portion of sky during 525 observation nights spread over 5 years (2012 start) using the 570 MPixel CCD camera (DECam) it built for the Blanco 4-meter telescope at the Cerro Tololo Inter-American Observatory, Chile

The Astrophysical Journal, 753:152 (25pp), 2012 July 10 doi:10.1088/0004-637X/753/2/152


# SUPERNOVA SIMULATIONS AND STRATEGIES FOR THE DARK ENERGY SURVEY

J. P. Bernstein[1], R. Kessler[2,3], S. Kuhlmann[1], R. Biswas[1], E. Kovacs[1], G. Aldering[4], I. Crane[1,5], C. B. D'Andrea[6], D. A. Finley[7], J. A. Frieman[2,3,7], T. Hufford[1], M. J. Jarvis[8,9], A. G. Kim[4], J. Marriner[7], P. Mukherjee[10], R. C. Nichol[6], P. Nugent[4], D. Parkinson[10], R. R. R. Reis[7,13], M. Sako[11], H. Spinka[1], and M. Sullivan[12]

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[9] Physics Department, University of the Western Cape, Cape Town 7535, South Africa
[10] Department of Physics and Astronomy, Pevensey 2 Building, University of Sussex, Falmer, Brighton BN1 9QH, UK
[11] Department of Physics and Astronomy, University of Pennsylvania, 203 South 33rd Street, Philadelphia, PA 19104, USA
[12] Department of Physics, Denys Wilkinson Building, Oxford University, Keble Road, Oxford OX1 3RH, UK
*Received 2011 November 5; accepted 2012 May 7; published 2012 June 25*

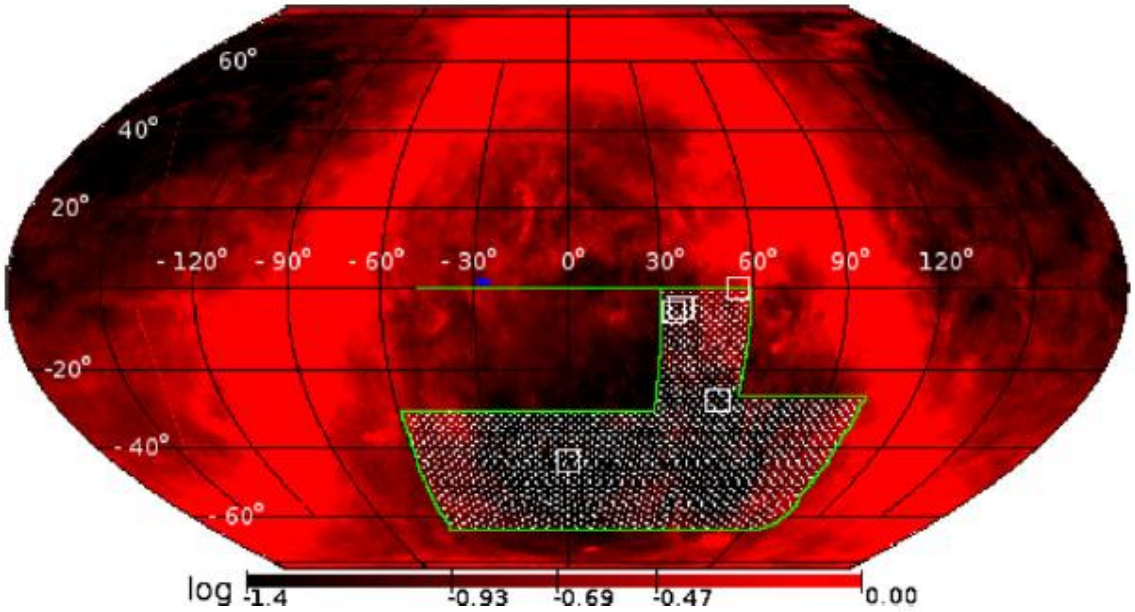
## ABSTRACT

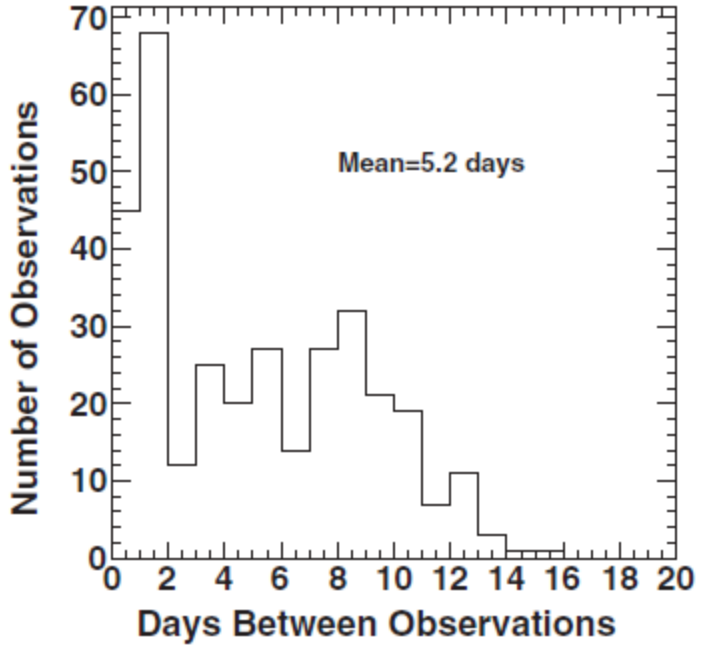
We present an analysis of supernova light curves simulated for the upcoming Dark Energy Survey (DES) supernova search. The simulations employ a code suite that generates and fits realistic light curves in order to obtain distance modulus/redshift pairs that are passed to a cosmology fitter. We investigated several different survey strategies including field selection, supernova selection biases, and photometric redshift measurements. Using the results of this study, we chose a 30 deg$^2$ search area in the *griz* filter set. We forecast (1) that this survey will provide a homogeneous sample of up to 4000 Type Ia supernovae in the redshift range $0.05 < z < 1.2$ and (2) that the increased red efficiency of the DES camera will significantly improve high-redshift color measurements. The redshift of each supernova with an identified host galaxy will be obtained from spectroscopic observations of the host. A supernova spectrum will be obtained for a subset of the sample, which will be utilized for control studies. In addition, we have investigated the use of combined photometric redshifts taking into account data from both the host and supernova. We have investigated and estimated the likely contamination from core-collapse supernovae based on photometric identification, and have found that a Type Ia supernova sample purity of up to 98% is obtainable given specific assumptions. Furthermore, we present systematic uncertainties due to sample purity, photometric calibration, dust extinction priors, filter-centroid shifts, and inter-calibration. We conclude by estimating the uncertainty on the cosmological parameters that will be measured from the DES supernova data.

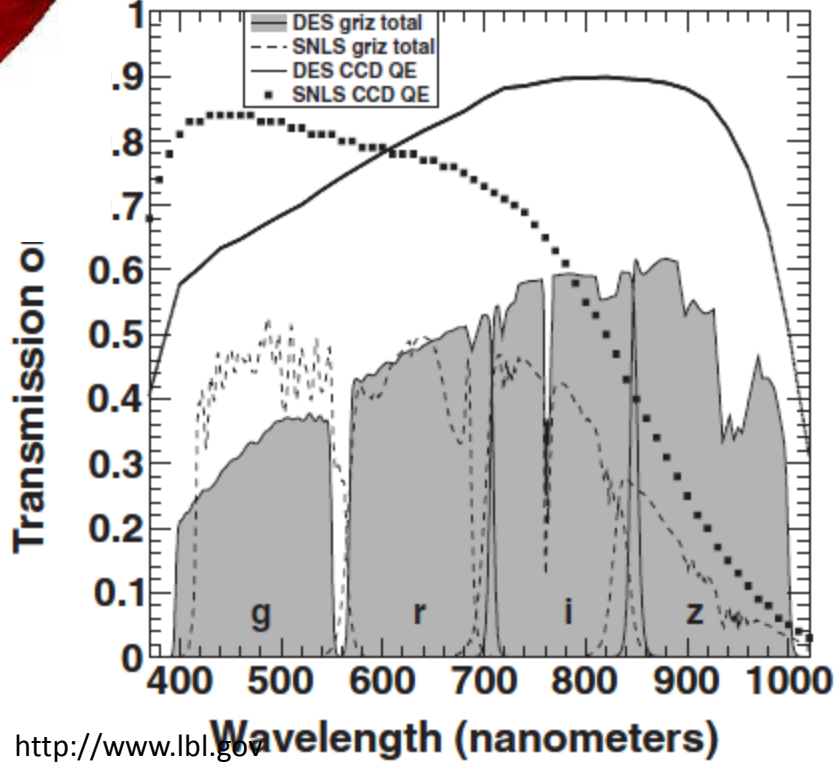
*Key words:* cosmological parameters – dark energy – supernovae: general

*Online-only material:* color figures

# Choices: Where to Look, How Often to Look, What Colors to Measure?

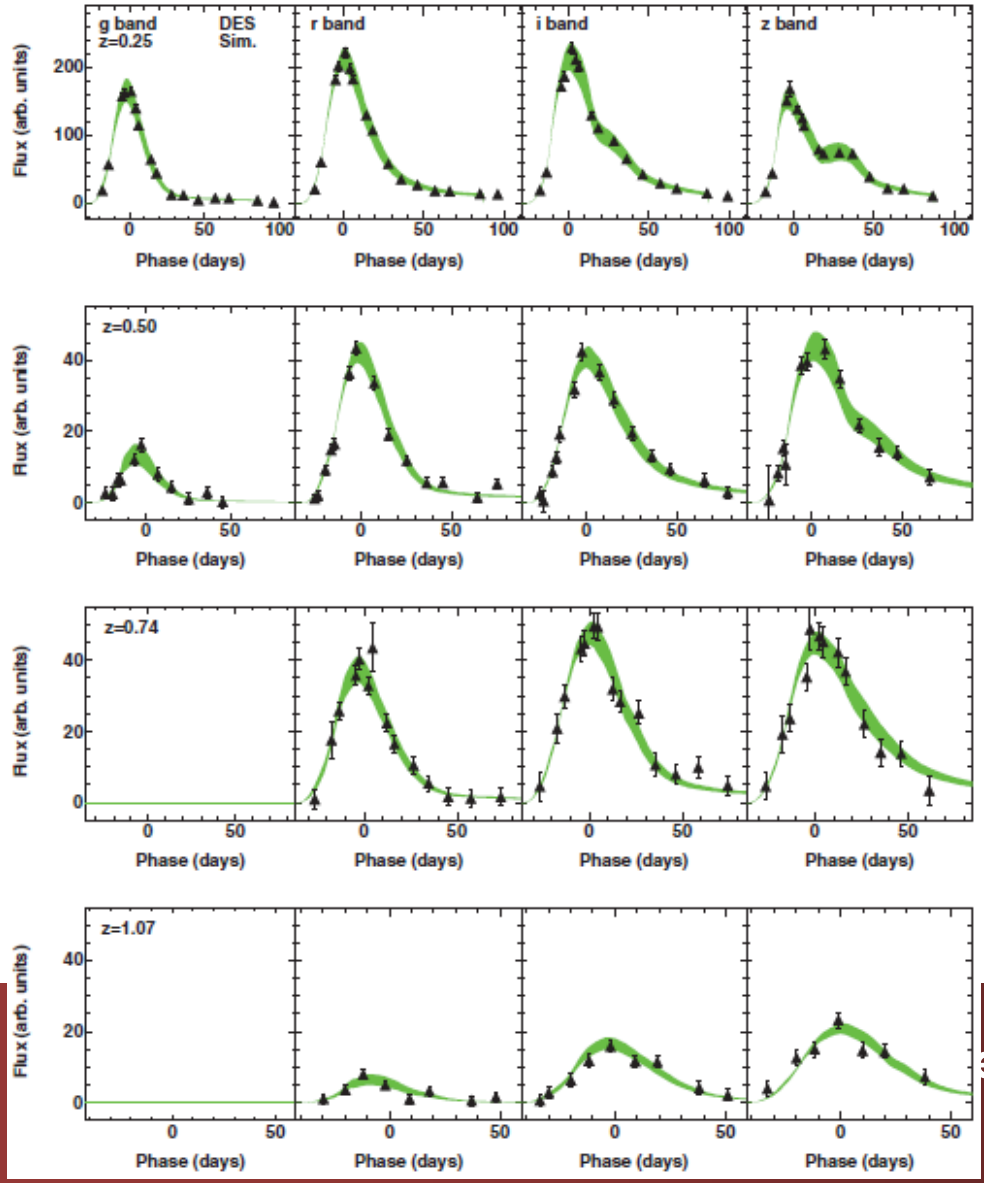


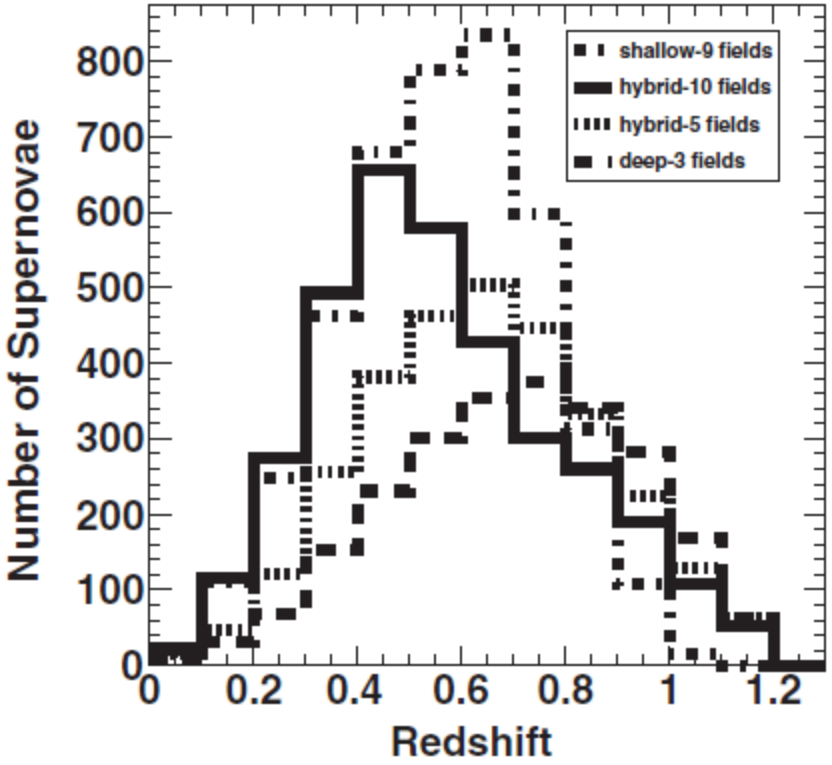




http://www.lbl.gov

# Implications: Data Quality and Amount?

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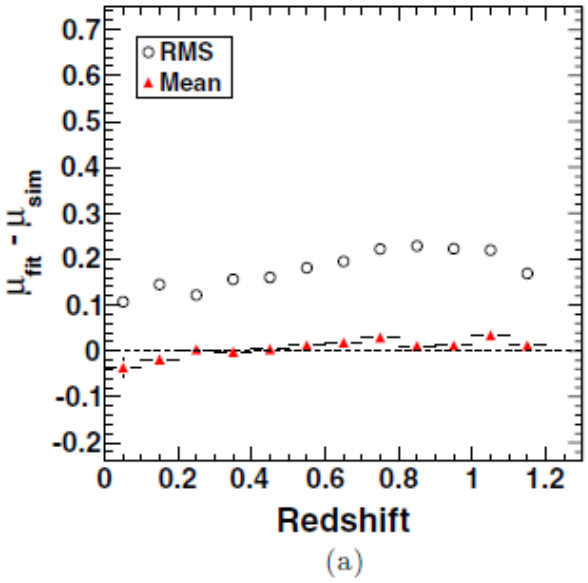
# Implications: Biased Results?



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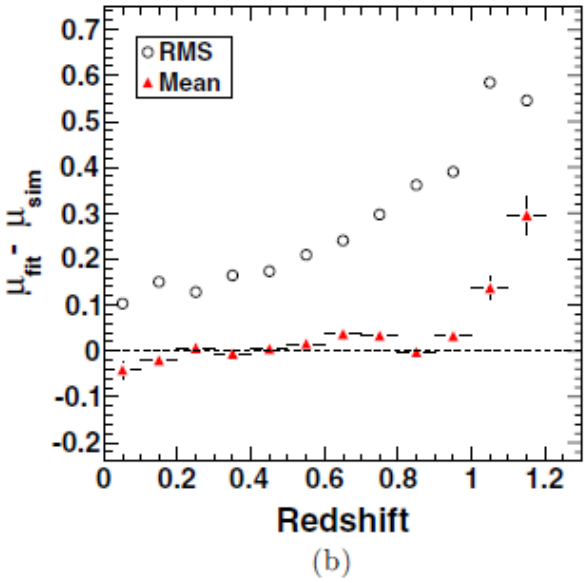

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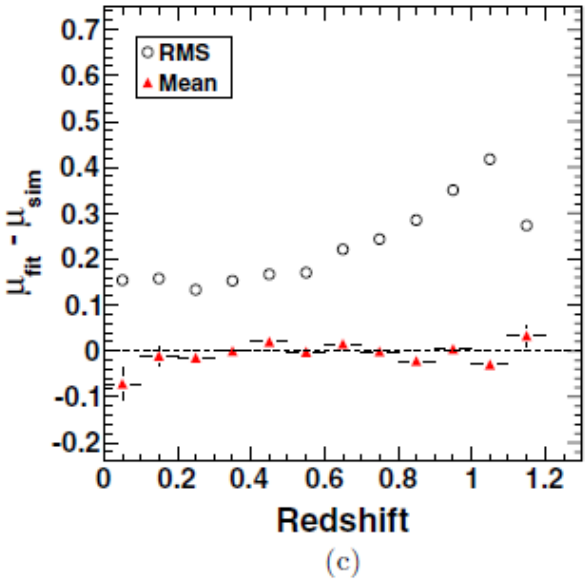

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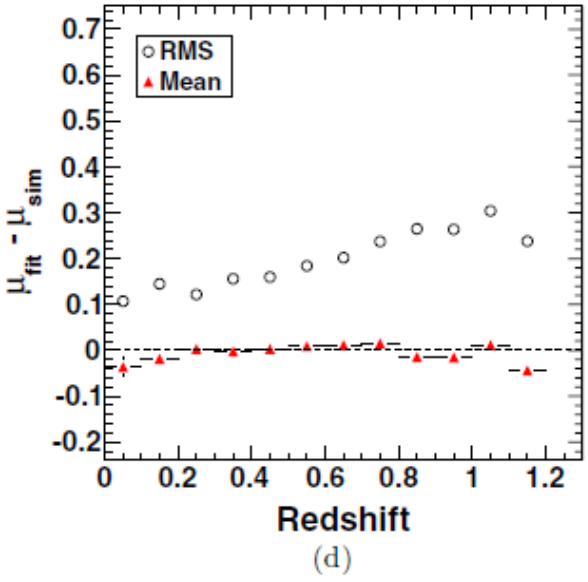

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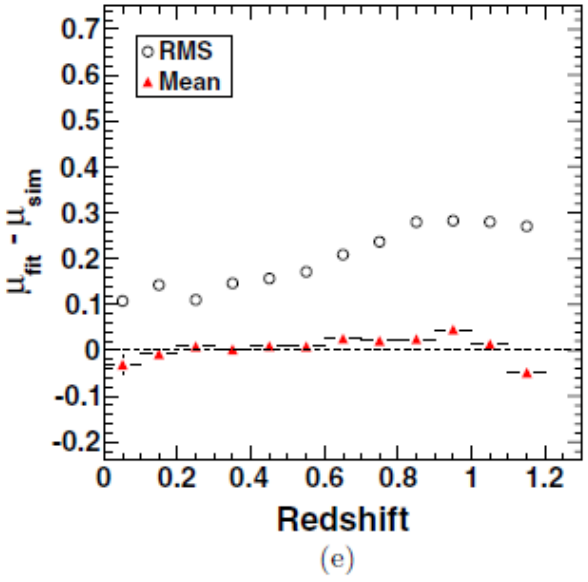
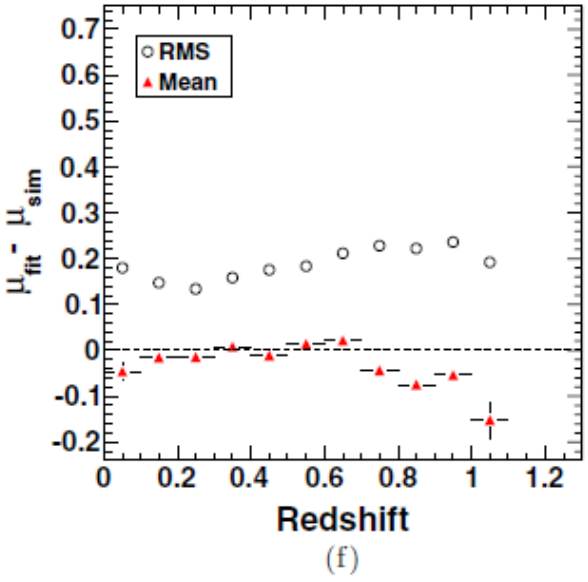
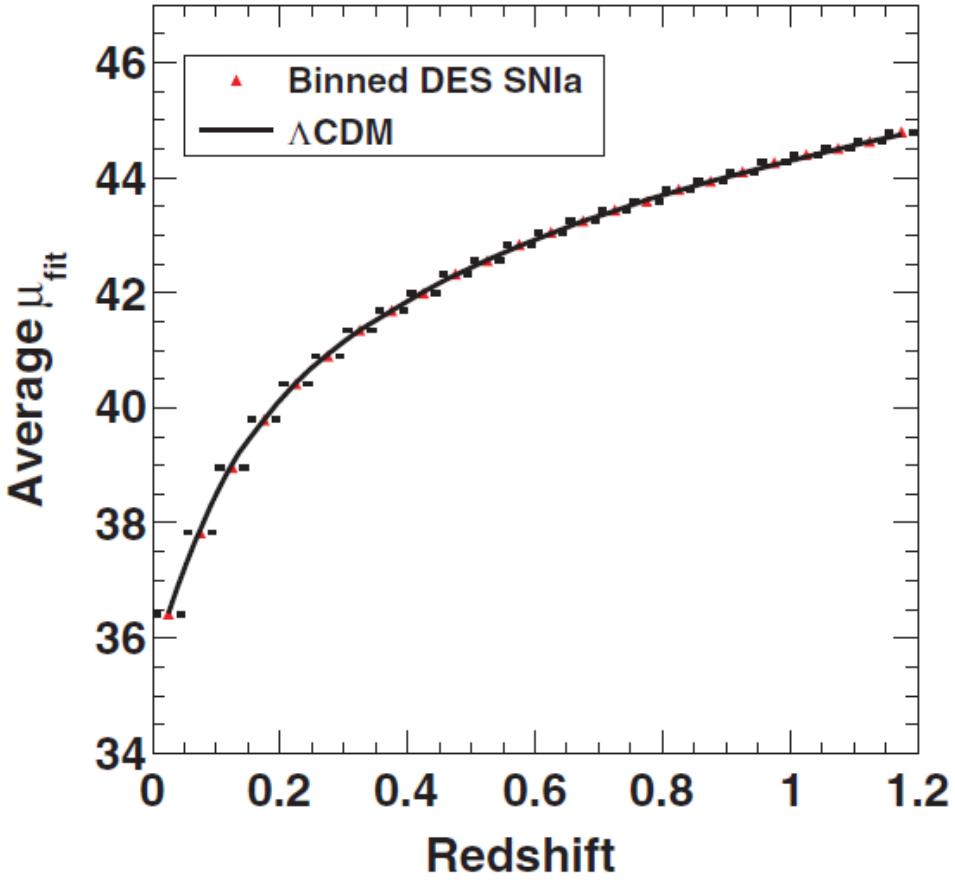


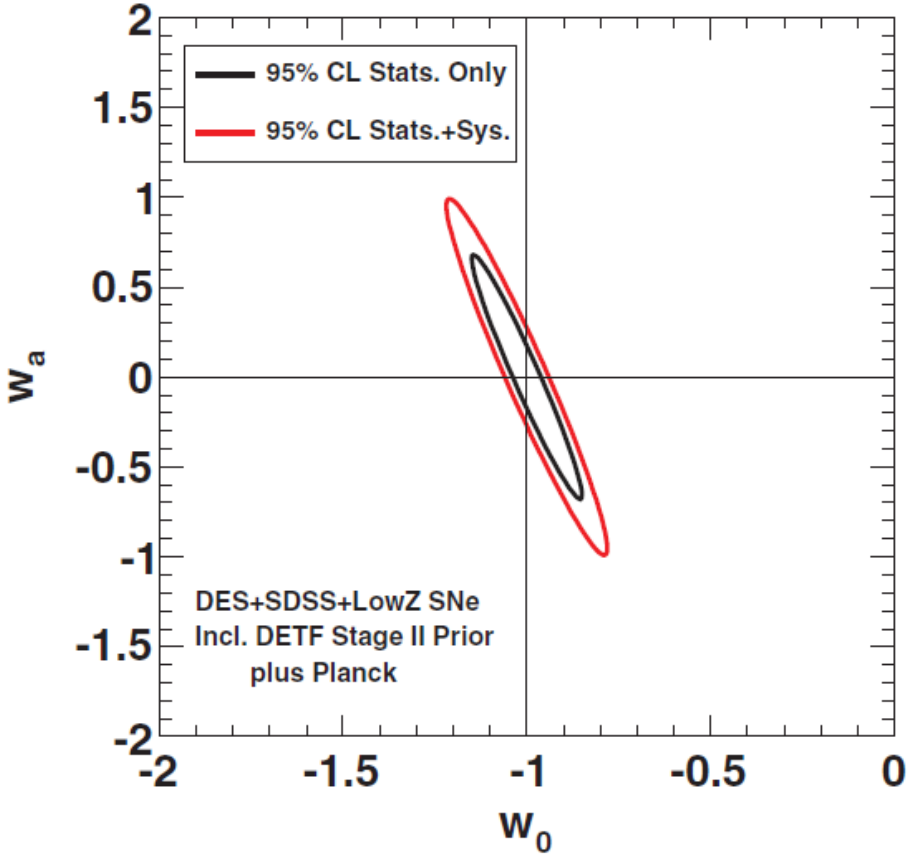
(e)



(f)

# Implications: Measurement Accuracy?



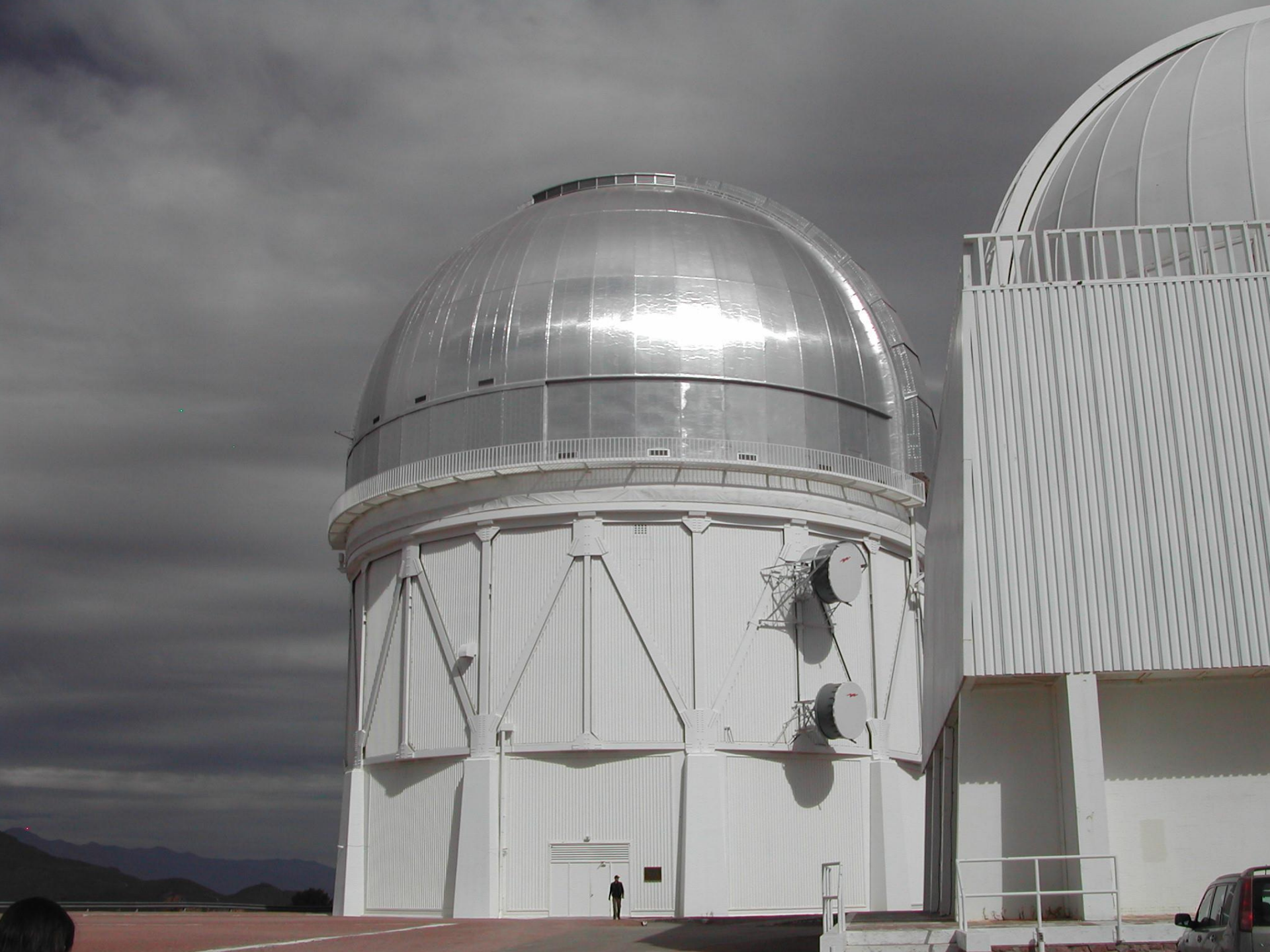



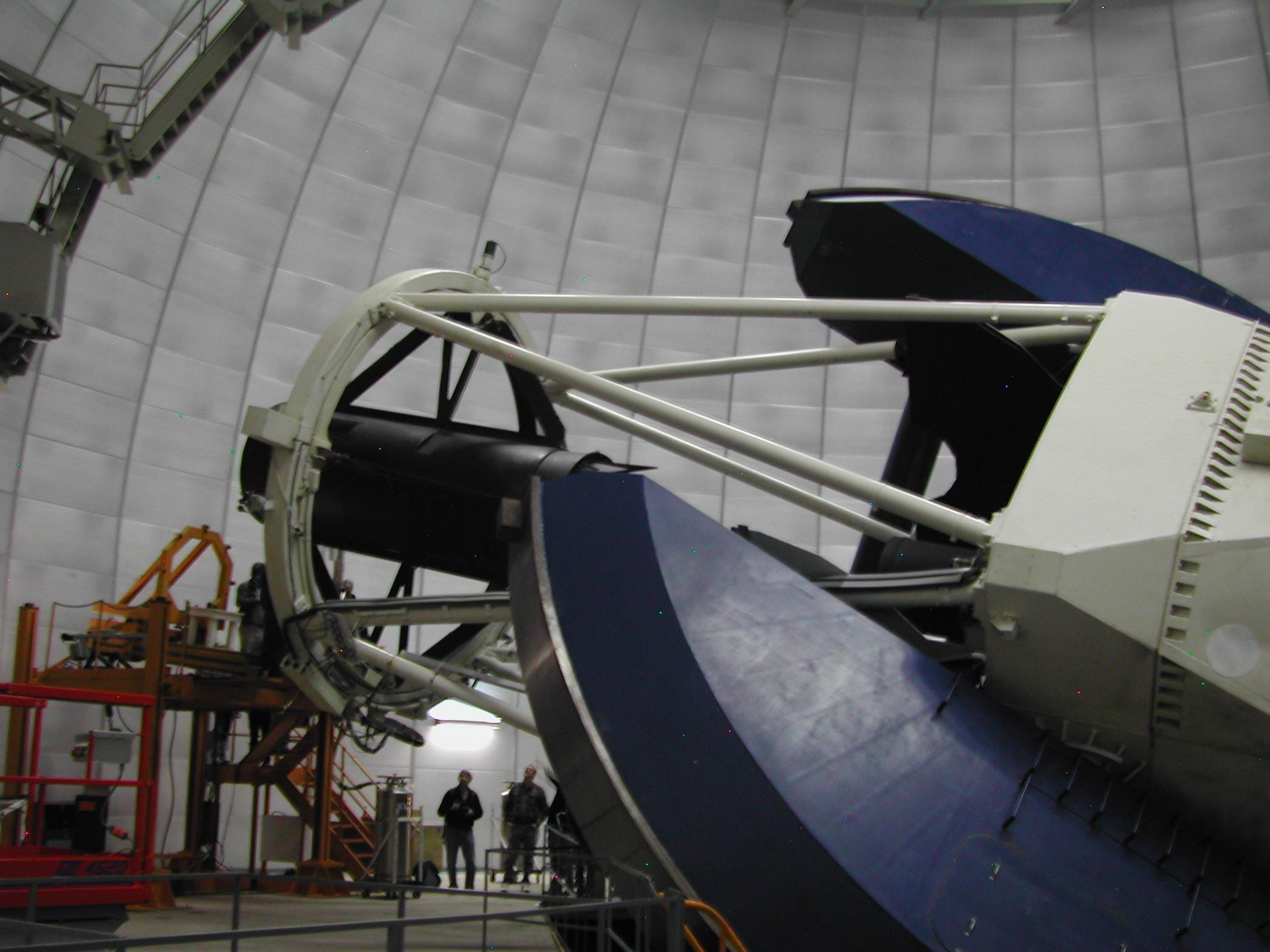
# Prototype DECam Imager Output (using poor-grade detector chips)

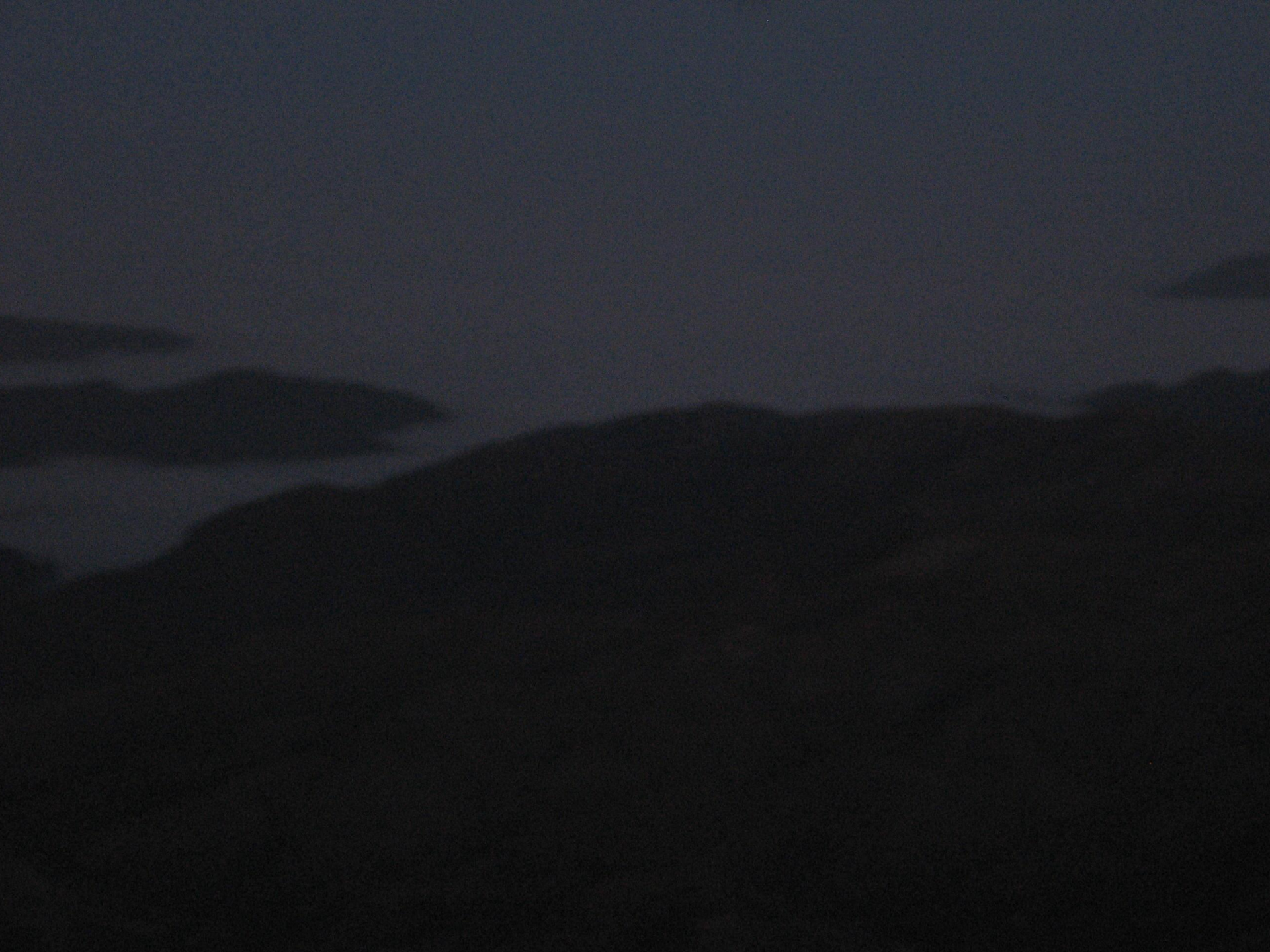
# First DES Image – September 12, 2012

Zoomed-in image from the Dark Energy Camera of the barred spiral galaxy NGC 1365, in the Fornax cluster of galaxies, which lies about 60 million light years from Earth. Credit: Dark Energy Survey Collaboration.

# Cerro Tololo Inter-American Observatory








AEROPUERTO LA EL ORDA
NISSAN


EN ESTAS TIERRAS
NACE EL PISCO
DE TODOS LOS CHILENOS
FRENTE
A SOLERAS
AMARILLA
Banda Ancha
Móvil Ilimitada
SENARQ


LAN

# The Blanco & The Milky Way

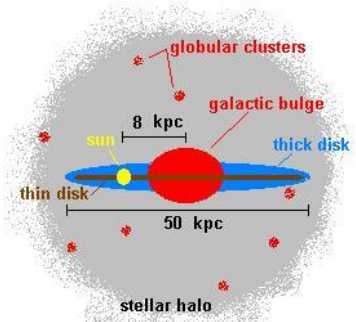



Image courtesy
Mike Fanelli

THE
CH

What are your dreams?

The Blanco telescope dome at Cerro Tololo, Chile. Single, non-composite image taken using a 2Kx2K scientific CCD temporarily mated to a custom camera. 20 sec exposure, 40mm f/4 lens, starlight only.
Credit: Roger Smith/NOAO/AURA/NSF

"Take chances, make mistakes, get messy!"

– Ms. Frizzle

Questions?

Thank you!

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Slides (excluding photo tour) available upon request