Intro to the Astronomy Department and Discussion of Research Practices/Careers

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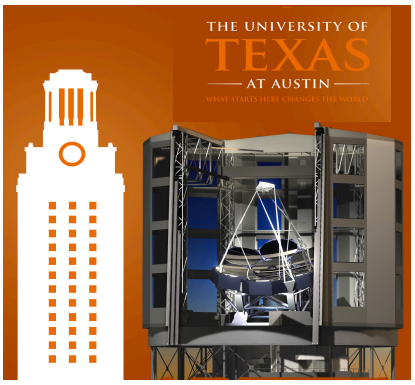
Outline

- Astronomy Department and Mc Donald Observatory
- Make the Most of Your Stay!
- Starting and Making the Most of UG Research: 10 tips
- My Personal Advice for Success

Welcome to the Astronomy Department at UT Austin !



Astronomy Department and Mc Donald Observatory

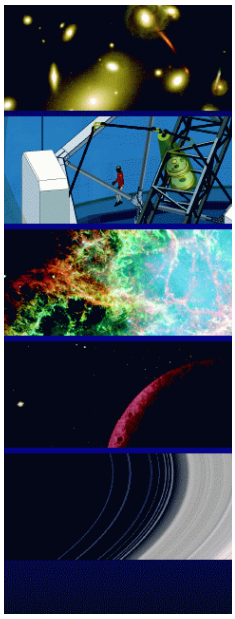
Our program contributes to UT Austin's 2015 ranking in Space science **as 4th among US public Universities and 10th worldwide** (US News & World Report)

A top-rated broad research program encompassing stars cosmology, galaxies, stars, the interstellar medium, planets, the solar system, and instrumentation.
(See ***http://www.as.utexas.edu/astronomy/research/***

Demographics (185 core members)
24 active faculty, 20 research scientist/staff
~12 postdoctoral fellows
40 graduate students
105 undergraduate majors (+4000 non-science majors)

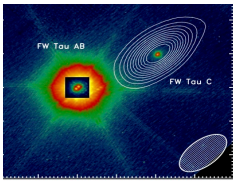
Student to (faculty + research scientist) ratio ~ 2 to 1
→ close interaction of students with faculty
→ vibrant research opportunities

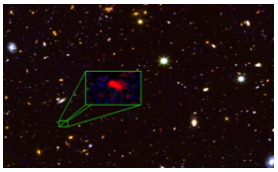
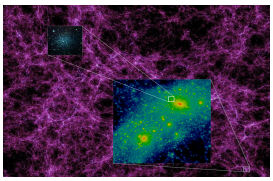
Strong external grant funding (National Science Foundation, NASA ,etc) yearly average ~ 5 millions



Make the Most of Your Stay!

- Talk to members of our five different research groups and our EPO team
  http://www.as.utexas.edu/astronomy/research
  Stars
  Planetary Systems and Interstellar
  Extragalactic
  Instrumentation & Device Development
  Theory



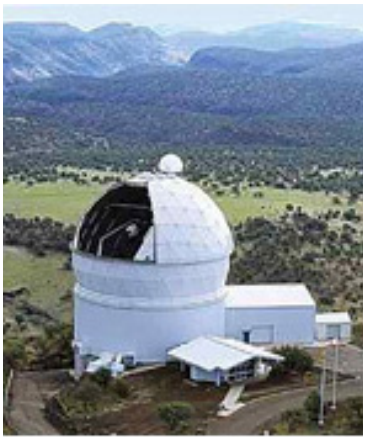





Make the Most of Your Stay!

- Check our UG pages for research resources, tips on how to apply to grad school, summer interships for your next summer, and more
  http://www.as.utexas.edu/astronomy/education/ugradstudies.html
- Check for weekly events, seminars on our calendar and attend
  http://www.as.utexas.edu/calendar/
- Join in ASA activities
  http://www.as.utexas.edu/~asa/
- Join AWARE (Women in Astronomy)
- http://www.as.utexas.edu/~sj/aware/

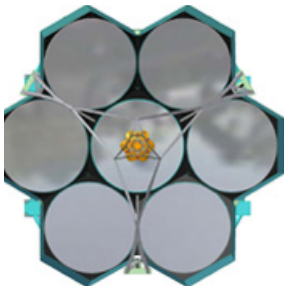
- Report any sexual harassment, misconduct, or bias incident to me or any of the faculty or TAURUS coordinators. Department/University resources at
  http://www.as.utexas.edu/astronomy/resources.html

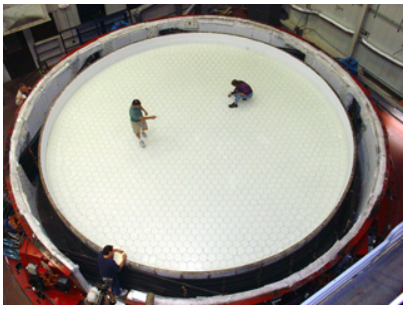
Make the Most of Your Stay!



Visit Mc Donald Observatory, home to some of the largest telescopes in the world : 9.2m Hobby Eberly Telescope, 2.7m Harlan J. Smith Telescope, 2.1m Otto Struve telescope .

Make the Most of Your Stay!





Learn about the Giant Magellan Telescope (GMT)
22 m aperture (seven 8.4-m mirrors) First light in ~2021

GMT partners include **UT Austin**, Harvard, Texas A&M, Univ. of Arizona, Carnegie Institution of Washington, Smithsonian Astrophysical Observatory, Australian National University

Starting and Making the Most of UG Research: 10 tips

Starting and Making the Most of UG Research: 10 Tips

1) Learn skills frequently needed for research

- Take the chance to put yourself out there and experience a new challenge

- Critical thinking, problem solving skills: think creatively and outside the box!

- Learn basics of research
  Research practices, scientific method, ethics
  Communication, literature search, funding

- Learn basic operations using Linux/Mac OS X operating system
  e.g., login, file/directory structure, file operations and transfer

- Learn basic programming with IDL, Python or other language (e.g. C++)
  - for array manipulations & reading multi-dimensional catalogs
  - for statistical analyses & producing scatter plots + histograms

Starting and Making the Most of UG Research: 10 Tips

2) Talk to faculty/staff whose research interest you.

Finding Researchers Within UT

- Research Opportunities with the Astronomy Faculty and Staff
  http://www.as.utexas.edu/astronomy/education/opportunities.html
- EUREKA (Enhancing UG Research Experience Knowledge and Access)
  CNS-wide search *http://www.utexas.edu/research/eureka/*
- Talk to faculty after seminars, colloquia and at ASA meetings
  http://www.as.utexas.edu/calendar/ : Astronomy Calendar

Starting and Making the Most of UG Research: 10 Tips

Find Research Advisors outside UT

- Research Experience for UGs (REU) for 10 summer weeks funded by NSF
  http://www.nsf.gov/crssprgm/reu/
  Very competitive. Prior research experience helps
- Many other options listed at
  http://www.as.utexas.edu/astronomy/education/ug-research/

e.g.,
- Space Telescope Science Institute (STScI) summer program
- ASTRON/JIVE International Summer Students Programme in the Netherlands.
- University of Tokyo Summer Internship (UTRIP)

Starting and Making the Most of UG Research: 10 Tips

3) Before you approach a professor, do your research "homework"

- Read her or his website
- Read recent publications.
  NASA ADS : *http://adsabs.harvard.edu/abstract_service.html*
  Astrophysics Preprint Server: *http://xxx.lanl.gov/find/astro-ph*
- Talk to other students in his/her group & their papers
- Get your CV ready

Starting and Making the Most of UG Research: 10 Tips

4) Email faculty/staff to enquire about research opportunity

- Mention briefly your science interest, research experience, skills relevant for research
- Attach a CV with details and include name of references
- If relevant, discuss courses you have taken or offer to send transcript
- Do NOT send a generic mass-mail to faculty.

Starting and Making the Most of UG Research: 10 Tips

5) Be tenacious, flexible, and pro-active

- Your first choice faculty may not have a project so be prepared to talk to many people.
- Start early: you may need to go and take an extra course or learn a programming language
- Note that during the summer, many faculty members are supported fully by their research grants and are often away from UT: conducting research with non-UT collaborators, speaking at conferences, etc. Check schedule of faculty ahead of time

Starting and Making the Most of UG Research: 10 Tips

6) During meeting with faculty advisor

- Ask faculty about his/her expectations and timeline of project
- Ask about the time commitment expected of you. If you cannot meet this, *** indicate this early on****
- Discuss your timeline and goals

- Inform faculty when you will apply for jobs or graduate/professional school
- If you work hard and do your share, will the nature of the project allow you to havesomething substantial (poster, talk, paper) before you apply? Or is this a long term project where a lot depends on collecting new data or on work of other people?

- How often will you meet with faculty? Will you work with his/her graduate students and postdocs?

Starting and Making the Most of UG Research: 10 Tips

7) What is expected of you during a project?

- Intellectual curiosity, commitment to learning, creative thinking
- Show up for appointments!
- **Honor the time commitment you made with your advisor**
  Even if you take a 3hr conference course, it is usually expected you will spend a total of >=10 hr per week during the semester & more in the summer doing the research and reading.
- Report your progress and mistakes & seek guidance from you advisor
- **Self-motivation & independence**
  Learn to work independently. Try to solve problems on your own using books, online resources, creativity.....
- **Meet deadlines and be a team player**

Starting and Making the Most of UG Research: 10 Tips

8) Have fun and take advantage of UT/departmental resources & awards

- Awards, Scholarships & Financial aid

(See links on class website, under 'Extra class Resources/UG Research)
e.g., ***http://www.as.utexas.edu/astronomy/education/scholarships.html***

- Departmental awards for travel and research support

http://www.as.utexas.edu/astronomy/education/uawards.html
e.g., Walton Funds for Undergraduate research at McDonald Observatory

- Departmental Prizes (you must be nominated by a faculty or staff)

→ Astronomy Freshman Prizes for Excellence
→ Henize Endowed Scholarship
→ Board of Visitors scholarship
→ Outstanding Senior award

Getting Started and Making the Most of UG Research

9) Present + publish your work as you go along (posters, talks, papers)

a) Posters: recommended in early stages of research. Present at specialized conferences for UGs and at AAS meetings

Astronomy Undergraduates present their research at the College of Natural Sciences Undergraduate Research Forum in 2006

Starting and Making the Most of UG Research: 10 Tips

9) Present + publish your work as you go along (posters, talks, papers)

b) Talks

- Informal seminars in our department, student organizations, and visiting institutes. You will give one this summer at UT !
- Conference talks: Start wilth specialized UG conferences and advance to domestic and international conferences at exotic locations

c) Unrefereed Papers

d) Refereed Papers:

Ringberg Meeting in Germany on Galaxy Evolution

- Try to have some publication (or substantial contribution in other form) before you apply for jobs or graduate/professional school in Fall of year 4

Starting and Making the Most of UG Research: 10 Tips

10) Suggested timeline and checklist

Target	Timeline
➢ A Research Methods Course e.g., AST 376	Year 1 or 2
➢ If possible take part in FRI stream	Year 1 (Spring)
➢ Get involved in an individual research research project with faculty	Start of Year 1 or 2
➢ Try to take a scientific computing course (e.g., SDS 322 or SDS 335)	Ideally Year 1 or 2
➢ Research Experience/Intership for 10 weeks in the summer	Apply in Jan/Feb of years 2-4 Very competitive. Prior research

10) Suggested timeline and checklist

Target	Timeline
➢ Present and publish your results as you go along via talks, posters conference proceedings and journals	Years 1 to 4. Try to have some publication before you apply for jobs, grad/professional school in Fall of year 4.
➢ Maintain good GPA (>3.5 for top graduate schools)	All years, but especially by end of year 3
➢ If GPA>3.0, apply for B.S in Astronomy with Honors and do a Senior thesis on your research	By end of Year 3
➢ For jobs/graduate school Give CV (including skills, research projects, publications and posters) and RESEARCH statement to your letter writers,	At least 6 weeks before you apply for REUs, jobs or grad/prof school

Dean's Honored Graduate awards, given to fewer than1% of the graduating class across the College of Natural Sciences, were given to astronomy majors Serafina Nance and Rebecca Larson in 2016. Their journey to this milestone epitomizes the message that failure is essential for success

My Personal Advice for Success

1) Take the chance to put yourself out there and experience a new challenge

2) Dream big and work hard

3) Do not accept "No" based on stereotypes

4) Take advantage of serendipity

5) Failure is essential for success

6) We all experience the Imposter Syndrome