1. What do Astronomers Study?

- Planets
- **#** Solar System
- Stars
- ₭ "Star Stuff" (Interstellar Medium)
- Galaxies
- ₭ AGN/Quasars
- **#** Clusters
- Universe

1. What do Astronomers Study?

Solar System ▲Sun △Solar Wind △Planets △Moons Asteroids/NEOs ✓Kuiper belt objects ☐ Interplanetary dust ⊡etc....



1. What do Astronomers Study?

🔀 Stars

- ✓Variable stars
- △Binary systems
- Dwarfs, Giants, etc
- Supernovae,
- Compact Objects (black holes, white dwarfs, neutron stars)



1. What do Astronomers Study?

₭ "Star Stuff"
(Interstellar Medium)
Star formation & Protostars
Chemistry
Structure, Phase, and evolution



PRC95-44a · ST Scl OPO · November 2, 1995 J. Hester and P. Scowen (AZ State Univ.), NASA

1. What do Astronomers Study?

Galaxies
Formation & Evolution
Structure
Populations
Dynamics
Environment (voids, field, groups, clusters)

1. What do Astronomers Study?

AGN (Active Galactic Nuclei) & Quasars
Formation
Classification
Fueling
Evolution
Number Density



Radio Galaxy 3C296 Radio/optical superposition Copyright (c) NRAO/AUI 1999

1. What do Astronomers Study?

Clusters
Formation & Evolution
Structure
Dark Matter Content
∟ensing



1. What do Astronomers Study?

₭ The Universe

△Age and Size

- Formation & Evolution
- Content (dark matter, cosmic strings, exotic particles)

☑ Topology (shape)



2. How do we Work?

₭ Observations

ground based (optical, near infrared, radio)

Space based (rockets & space platforms; UV, x-ray)

∺Computers

 analyze data
 solve complex problems

numerical simulations

#Analysis Objectivity read & assimilate many forms of data ☐linear & non-linear thinking **H**Writing research papers ✓ proposals Opresentations

3. Where do we Work?

🔀 Academia

- Research University
- Teaching University/College

₭ Research Facilities

☐ Government Labs
△ National Observatories

<mark>∺</mark>Other

- planetariums, telescope support, etc.
- Herivate Sector



4. How do we spend our time? (part 1 of 2)

- # Academia: Research
 University
 - ➡ bring in grant money
 - publish research papers
 - support observing facilities/instruments/ programs
 - Supervise thesis projects
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 - ☐ teach 1-2 classes/yr

% Academia: Teaching
University/College

- △teach 3-4 classes/yr
- △ advise students
- ☐run observatory labs
- Support public outreach
- ☐ less emphasis on research

4. How do we spend our time? (part 2 of 2)

Government Lab or National Observatory Support user community publish research papers manage people/projects generally little or no teaching or grant raising

#Other/Private Industry

- 🗠 planetariums
- ☑ science writing
- △ telescope operators
- △ science education
- computer programming/ systems support
- 🗠 web design
- 🗠 defense industry
- communications industry
- "rocket scientist" on Wall Street

5. Training

High School

course work: college prep physic, chemistry, math (pre-calc) Advanced placement helps

College

major: Astronomy, Physics, Astrophysics (others possible, e.g. Math, Chemistry) **Timeline:** ~ 4 years to B.S. ~70 colleges/universities in U.S. offer Astronomy or Astrophysics degree

B average or better and decent GRE scores

Support:

Teaching or Research Assistant ~\$15,000 - \$20,000/yr plus tuition waiver

Graduate School

2 years of course work => M.S. Thesis research project **Timeline:** ~4-6 years to PhD After M.S., attrition is mostly voluntary long hours, but flexible schedule extensive all-expense paid travel to exotic locations

no or poor health and retirement benefits

5. Job Timeline



Payscale: \$45,000 - \$70,000 at "Assistant" Rank \$70,000 - \$90,000 at "Associate" Rank \$90,000 - \$170,000 at "Full" Rank geographically limited employment options extensive travel long hours

~22 years from High School before you know if you have a permanent position

Life as an Astronomer: 6. What Astronomers don't do **#**Tell your horoscope ³ Have a special line to space aliens #memorize the constellations Spend all their time looking through

telescopes

6. A Typical Day

- ₭ Read dozens of e-mails
- % attend some inane meeting
- **#** teach a class or advise a student on a research project
- **#** listen to or prepare a presentation on current research
- ₭ analyze some data or make a figure or plot
- **#** download relevant journal articles to be read "later"
- % work on a paper or a proposal for observing time or research grant