Life as an Astronomer:

1. What do Astronomers Study?

- Planets
- Solar System
- Stars
- “Star Stuff” (Interstellar Medium)
- Galaxies
- AGN/Quasars
- Clusters
- Universe
Life as an Astronomer:

1. What do Astronomers Study?

- Solar System
  - Sun
  - Solar Wind
  - Planets
  - Moons
  - Asteroids/NEOs
  - Kuiper belt objects
  - Interplanetary dust
  - etc....
Life as an Astronomer:

1. What do Astronomers Study?

- Stars
  - Variable stars
  - Binary systems
  - Dwarfs, Giants, etc
  - Supernovae,
  - Compact Objects (black holes, white dwarfs, neutron stars)
Life as an Astronomer:

1. What do Astronomers Study?

- “Star Stuff” (Interstellar Medium)
  - Star formation & Protostars
  - Chemistry
  - Structure, Phase, and evolution
Life as an Astronomer:

1. What do Astronomers Study?

- Galaxies
  - Formation & Evolution
  - Structure
  - Populations
  - Dynamics
  - Environment (voids, field, groups, clusters)
Life as an Astronomer:

1. What do Astronomers Study?

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

Radio Galaxy 3C296
Radio/optical superposition
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Life as an Astronomer:

1. What do Astronomers Study?

- Clusters
  - Formation & Evolution
  - Structure
  - Dark Matter Content
  - Lensing
Life as an Astronomer:

1. What do Astronomers Study?

- The Universe
  - Age and Size
  - Formation & Evolution
  - Content (dark matter, cosmic strings, exotic particles)
  - Topology (shape)
Life as an Astronomer:

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

- **Writing**
  - Research papers
  - Proposals
  - Presentations
Life as an Astronomer:

3. Where do we Work?

- Academia
  - Research University
  - Teaching University/College
- Research Facilities
  - Government Labs
  - National Observatories
- Other
  - Planetariums, telescope support, etc.
- Private Sector

![Pie chart showing the distribution of where jobs are located.](chart.png)
Life as an Astronomer:

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
  - teach 1-2 classes/yr
  - serve on committees

- Academia: Teaching University/College
  - teach 3-4 classes/yr
  - advise students
  - run observatory labs
  - support public outreach
  - less emphasis on research
Life as an Astronomer:

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
Life as an Astronomer:

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.

**Graduate School**
- 2 years of course work => M.S.
- Thesis research project
- Timeline: ~4-6 years to PhD

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

~70 colleges/universities in U.S. offer Astronomy or Astrophysics degree

B average or better and decent GRE scores

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
Life as an Astronomer:

5. Job Timeline

PostGraduate:
- largest attrition occurs 3-10 years post PhD
- 35% leave field, 20% "soft money", 45% potentially permanent

Postdoctoral Appt:
- Research
- work on your own research
- 1-3 year duration (terminal)

Postdoctoral Appt:
- hired under grant proposal
- ~50% of time on specific project
- 1-3 years duration (terminal)

Support Scientist
- where: National Obs. or Gov't Lab
- tenure track or contract
- potentially permanent

Tenure Track
- where: Research or Teaching College
- 5-6 years for “tenure review”
- potentially permanent

“Soft Money” Positions
- where: at an agreeable host institute
- may have to perform other duties at host institute
- non-permanent, depends on ability to raise grant $$

Payscale:
- ~10 years from High School
- $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
- Have a special line to space aliens
- Memorize the constellations
- Spend all their time looking through telescopes
Life as an Astronomer:

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