I Study How Galaxies Grow
2002: Largest galaxy survey with Hubble

2004: Hubble map of a super cluster of galaxies

2010-2011: New largest Hubble galaxy survey
But, what do astronomers really do?

I am a tenure-track Assistant Professor:

**Teaching**
- prepare/give lectures 40%
- design new exams & homework questions
- develop new courses
- meet w/ students
- learn new education methods

**Research**
- mentor team of student researchers 40%
- analyze/interpret data
- give talks about results
- write papers
- write funding/observing proposals
- external collaborations

**Service**
- director of UMKC public observatory 20%
- public outreach
- campus committees
- help run department (webpage, newsletter)
- recruit students
- external review (scientific papers/proposals)
Valley College (Los Angeles, CA)

First classes in calculus & physics, dreaming of being a scientist.

5 math (calculus I II III, linear algebra, diff.eq.)

3 physics

planetarium & 16-inch telescope
Example Roadmap:  My Story

University of California
(Los Angeles, CA)

1991-1994
First research experiences.
B.Sci. in Astrophysics

Math-Science building
(home to Astronomy Dept.)

12 advanced physics
(mechanics, E&M, quantum, thermo.,
particle physics, math methods)

5 advanced astronomy/astrophysics
Example Roadmap: My Story

University of Arizona
(Tucson, AZ)

1994-2001
First trips to observatories.
Ph.D. in Astronomy

Steward Observatory (Dept. of Astronomy)

10 graduate astronomy/astrophysics
3 graduate physics
(GR, nuclear, high-energy)
Example Roadmap: My Story

University of Massachusetts (Amherst, MA)

2001-2008
Post-doctoral Researcher

authored/co-authored 32 publications
numerous talks, colloquia, conferences
developed independent research plan (started mentoring students)

Lederle Graduate Research Tower
(home to Astronomy Dept.)
Applying for College/University

Where to apply?

+ choice not critical for your career (top graduate schools accept students from all private and public schools)

  Big universities:
  pros - often large dept. and PhD program; see grads. in action
  cons - professors are super busy, may not take undergrad. researchers
  Ask them!

+ weigh financial opportunities (scholarships, fellowships) against undergraduate institution prestige

  Typically, you will not have to pay for graduate school.
Useful Do’s at College/University

Find an advisor and a research project.
  Ask questions! Don’t be shy!

But your #1 focus should be coursework!
  + best grades possible
  + learn lots of physics (both problem solving and concepts)

What top graduate programs are looking for:
  + first cut based on high GPA and Physics GRE score
  + three (3) strong letters of recommendation
  + research experience
  + you can stand out with demonstrated curiosity, independence,
    self motivation, good communication skills
Useful Do’s in Graduate School

Now your #1 focus is research
+ take advantage of opportunities
+ work with more than one advisor (references)
+ read a paper a week
+ goal of one publication/year

Be visible
+ attend regular talks, conferences
+ talk science with peers, postdocs & faculty (informal references)
  
  Ask questions! Be engaged. Don’t be shy!
+ give talks (only way is to practice; every time you finish a project)

Goal: get a good postdoc or starting job
+ have ideas and be ready to communicate them
+ have knowledge of a broad range of topics
+ have a good toolkit of research skills
You have a PhD, now what?

Professor Glickman, the lab practical joker, deftly places a single drop of hydrochloric acid on the back of Professor Bingham's neck.

Buy this book!
A Roadmap to a Career in Astronomy or Physics

this talk on my profile at cas.umkc.edu/physics

Dr. Daniel H. McIntosh
Assistant Professor

Department of Physics

University of Missouri
Kansas City

Mathematics and Physics Institute
Independence, MO

Friday Feb. 5, 2010
PhD stats

Figure 3. Initial employment of physics and astronomy PhD’s by subfield of dissertation, classes of 2005 & 2006

X-axis: 0 20 40 60 80 100
Y-axis: Applied Physics, Optics & Photonics, Materials Science, Atmospheric & Space, Relativity, Nuclear Physics, Atomic & Molecular, Particles & Fields, Condensed Matter, Surface Physics, Biological Physics, Plasma & Fusion, Astronomy & Astrophysics

PhD Physicists Work Activity - 2001

<table>
<thead>
<tr>
<th>Activity</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching</td>
<td>5,801</td>
<td>17</td>
</tr>
<tr>
<td>Research - Academic</td>
<td>4,246</td>
<td>13</td>
</tr>
<tr>
<td>Research - Government/Non-Profit</td>
<td>3,488</td>
<td>10</td>
</tr>
<tr>
<td>Research - Industry</td>
<td>6,082</td>
<td>18</td>
</tr>
<tr>
<td>Applications</td>
<td>9,311</td>
<td>28</td>
</tr>
<tr>
<td>Managing/Supervising</td>
<td>4,184</td>
<td>12</td>
</tr>
<tr>
<td>Other</td>
<td>616</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>33,729</td>
<td>100</td>
</tr>
</tbody>
</table>

*AIP Statistical Research Center, Initial Employment Report.*