



Careers Beyond the Academy

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American Astronomical Society
<https://aas.org/comms/committee-employment>*



A little bit about me

- Have backed into almost everything I've ever done
 - I am an opportunist
- BS Physics, U Md. (1980)
 - Freelance musician in DC area, early 80's
- Part-time astronomy grad student, U Md., early 80's
- Transferred to UCLA in 1985
 - Mainly because I was not going to be separated from my future wife, who was about to go to USC!
 - PhD in Astronomy, 1990 (mass loss from evolved stars)
- Postdoc at MIT Haystack (radio) Observatory, 1990-93
 - Nearly took 2nd (NRC) postdoc at NRL...said yes, then put off start...then...
- Research staff at AXAF (later Chandra X-ray Obs.) Science Center at MIT, 1993-99
 - Made short list for Dept of Physics faculty position at U. Cincinnati, 1997
 - Made short list for remote sensing faculty position at RIT Center for Imaging Science, 1998
- (Ultimately) hired onto RIT Center for Imaging Science faculty in 1999
 - This time, to do astronomy (CIS Director had SOFIA funding)...and teach imaging science...whatever that is...
- RIT & Rochester, NY: happily ever after, etc.
 - Well, apart from having to scramble to maintain funding for my graduate students, the occasional postdoc, travel/computers/page charges, and my own summer salary



A little about my former (PhD) students

- Jinqiang (Dylan) Li, 2004, imaging science
 - Thesis: subpixel positioning of X-ray photons detected by Chandra's CCD spectrometer
 - Worked for Agilent, Qualcomm, and now Logitech (Austin, TX); Principle Engineer
- Sue Hojnacki (deceased), 2005, imaging science
 - Thesis: automated spectral classification of X-ray sources detected by Chandra's CCD spectrometer
 - Kodak remote sensing staff during PhD; then postdoc at RIT, JPL; then remote sensing researcher at LLNL
- Bo Mu, 2006, imaging science
 - Thesis: automated spectral classification of X-ray sources detected by XMM's CCD spectrometer
 - Fairchild Industries, then Quanergy (Silicon Valley)
- Young Sam Yu, 2009, imaging science
 - Thesis: the first (Chandra) X-ray gratings spectrum of a planetary nebula
 - Samsung; then Korean Astrophysics & Space Institute (tenure-track astronomer)



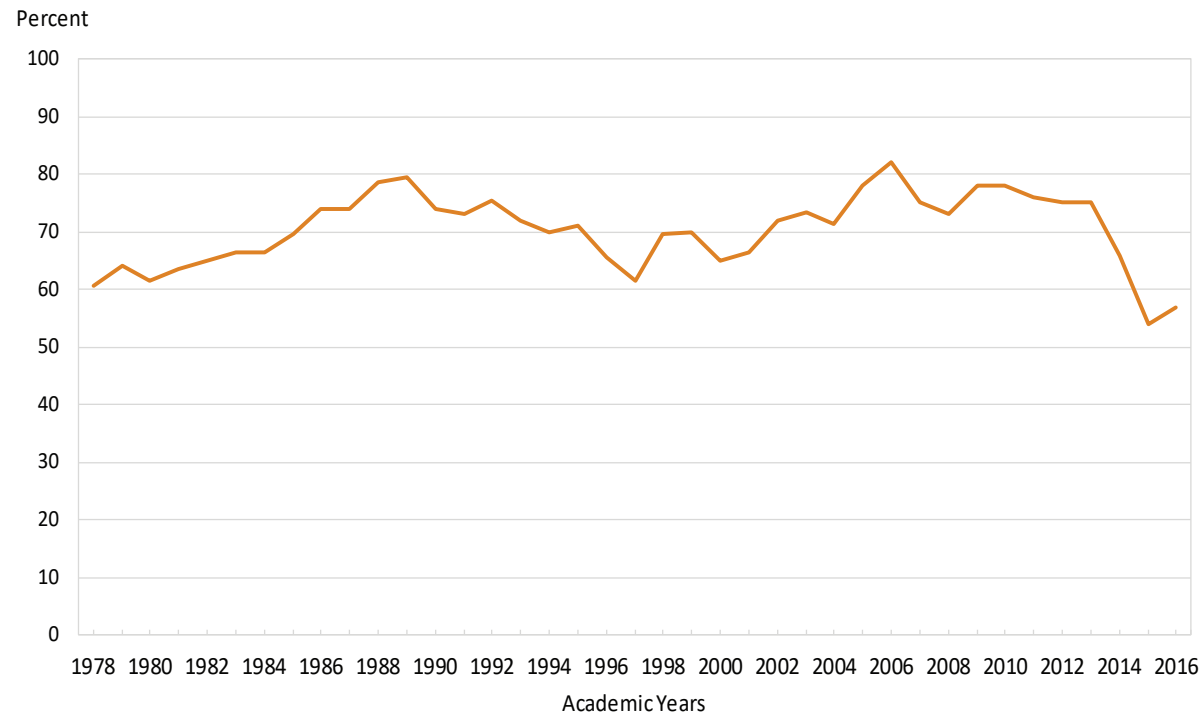
A little about my former (PhD) students (cont.)

- Rudy Montez, 2011, astrophysics (1st graduate of RIT's AST PhD program)
 - Thesis: X-rays from planetary nebulae
 - Postdoc at Vanderbilt U.; now on science staff of Chandra X-ray Center's Director's Office
- Dave Principe, 2014, astrophysics
 - Thesis: X-rays from nearby, dusty young stars
 - Postdoc at U. Diego Portales (Chile), then MIT's CXC; now on research staff of MIT's CXC
- Valerie Rapson, 2015, astrophysics
 - Thesis: IR observations of nearby protoplanetary disks
 - Outreach Astronomer at Dudley Observatory & Science Museum (Schenectady, NY)
- Marcus Freeman, 2015, astrophysics
 - Thesis: 3-D modeling of planetary nebulae
 - Left science world to work for Bowst (Portsmouth, NH): "custom software design & development"
- Kristina Punzi, 2018, astrophysics
 - Thesis: mm-wave and X-ray observations of nearby young stars
 - Non-tenure track, long-term faculty position at Wellesley College (Whitin Observatory Manager, lab instructor)



Before we go on: congratulations

Postdoctoral Acceptance Rates for New Astronomy PhDs,
Classes of 1978 through 2016

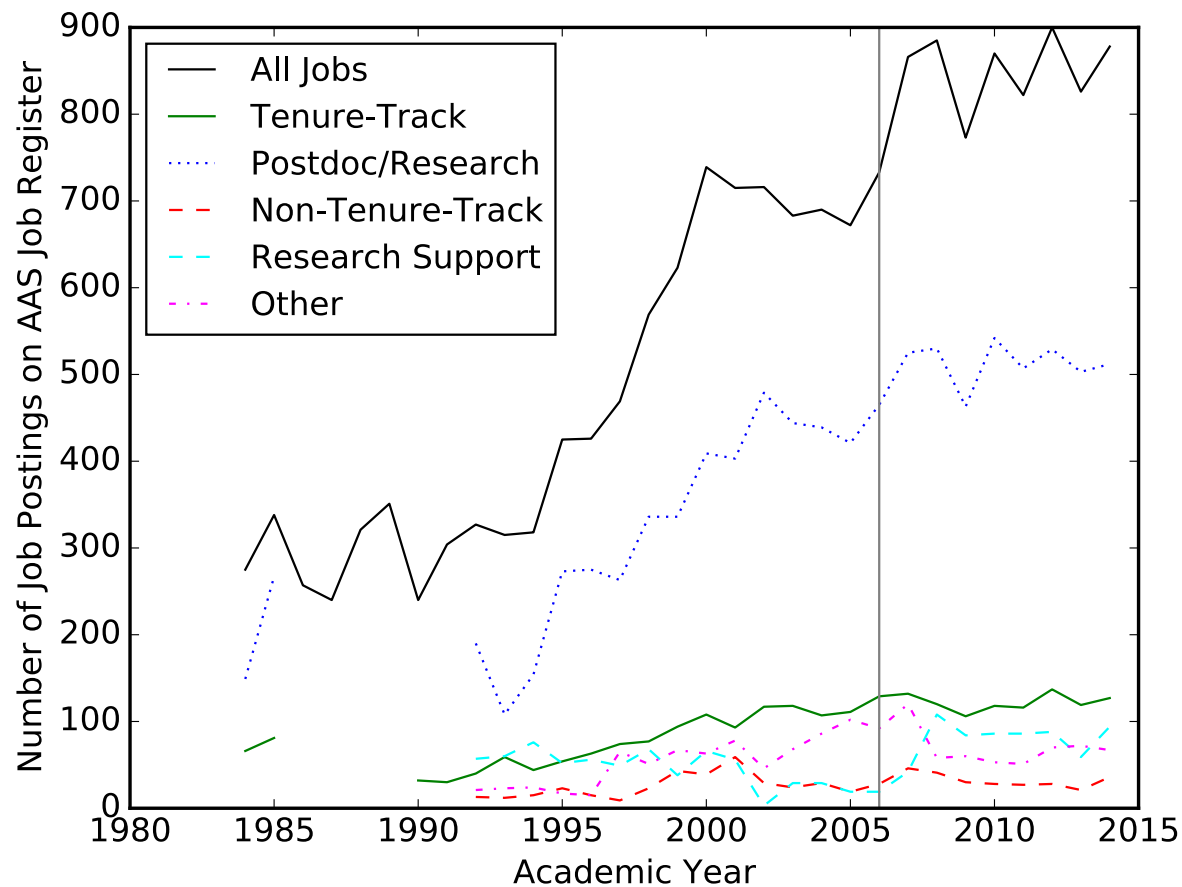


Data presented are 2-year averages and are limited to PhDs who earned their degrees from a US university and remained in the US.



AAS Job Register: job posting stats

compiled by Julia Kamenetzky (Westminster College) for AAS EC

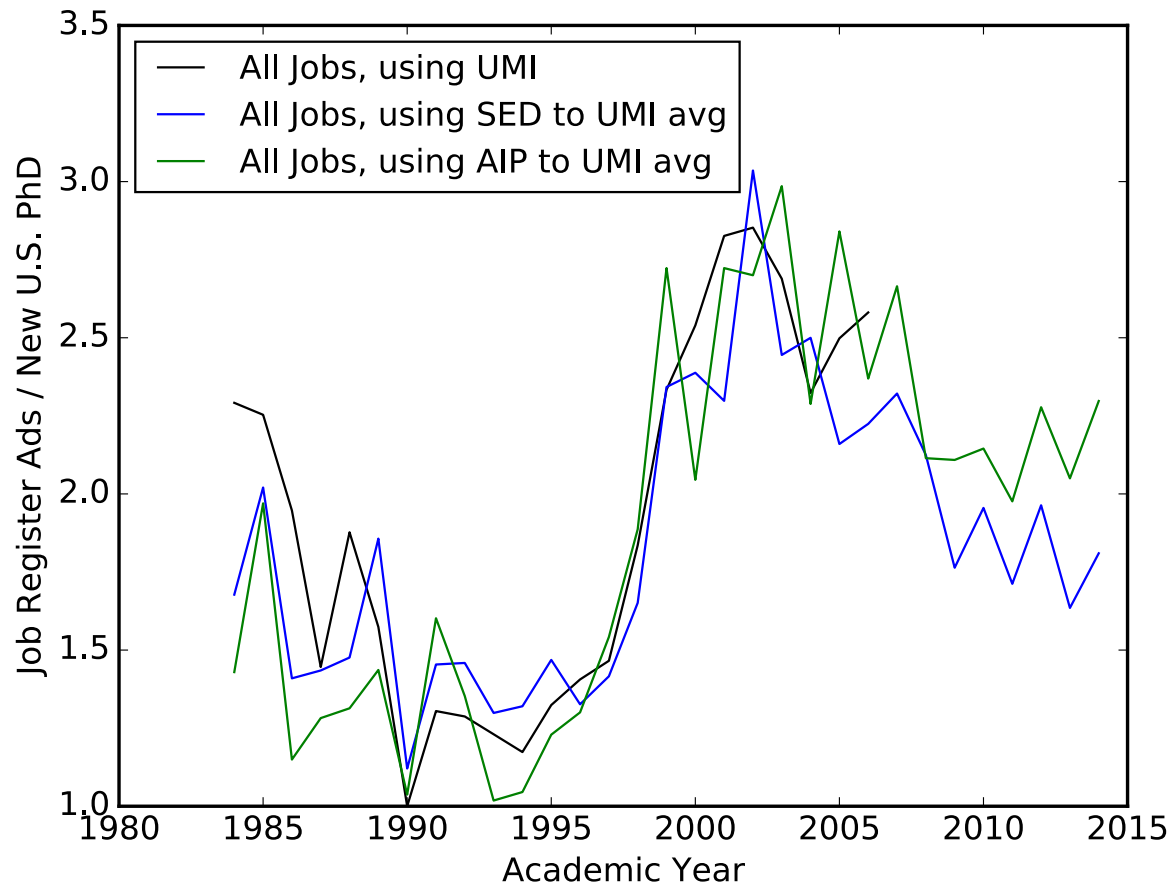


Vertical line at 2006: where Metcalfe (2008, PASP, 120, 229) study left off



AAS Job Register: job posting stats

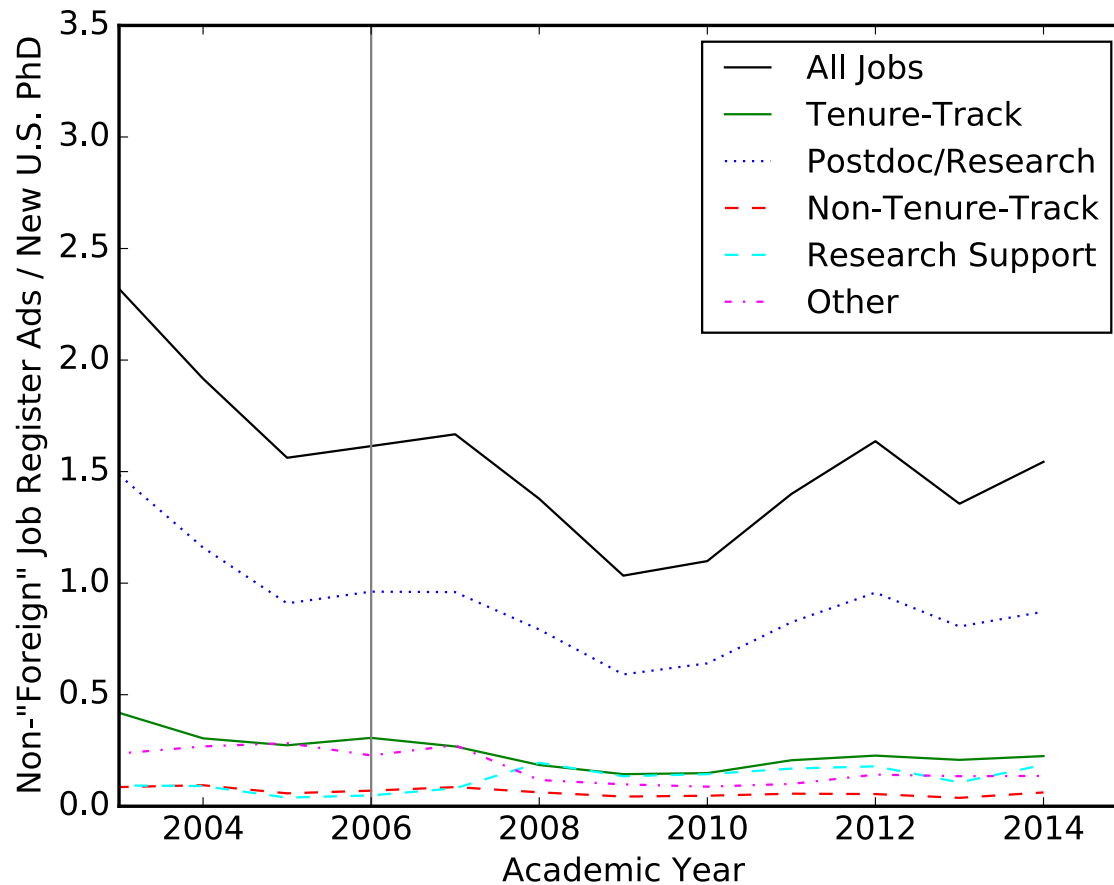
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AAS Job Register: job posting stats

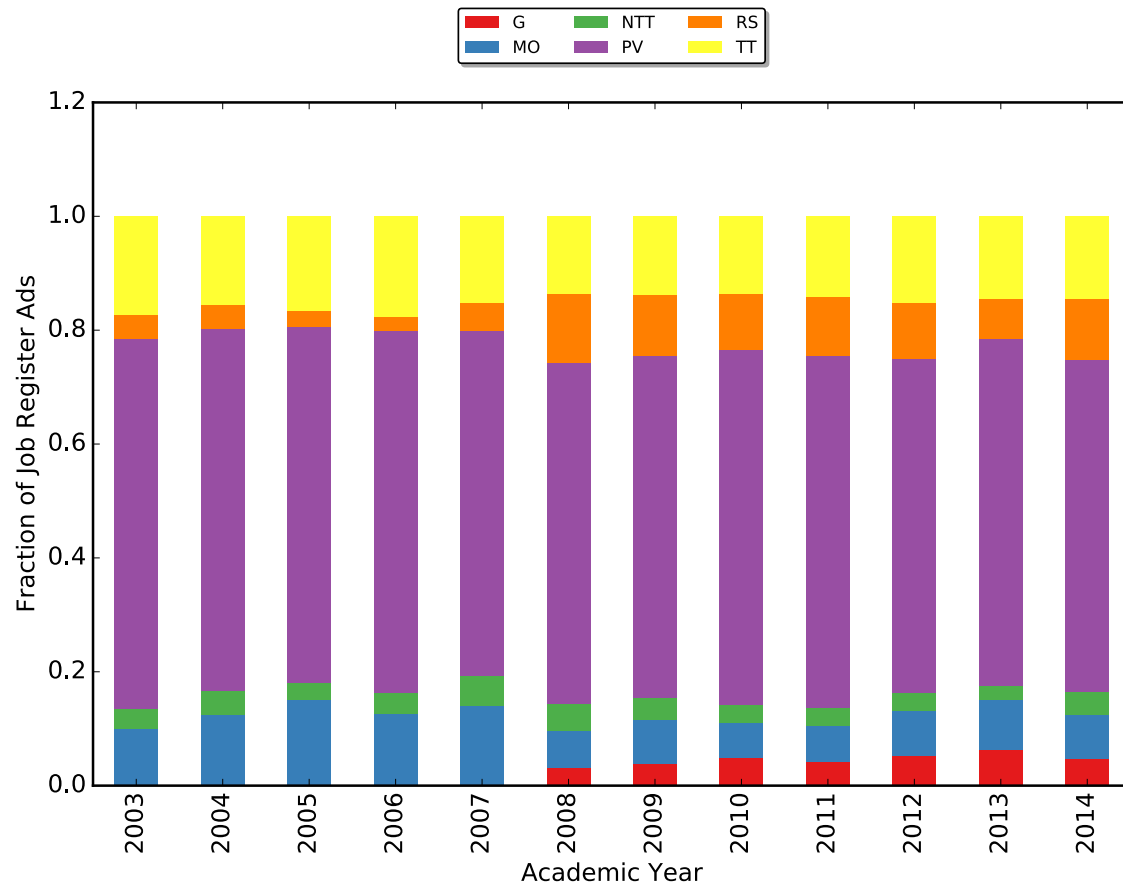
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AAS Job Register: job posting stats

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Key:

G = pre-doc

PV = postdoc

TT = tenure-track
NTT = non-tenure-track

RS = research support
(engineering, tech staff, etc)

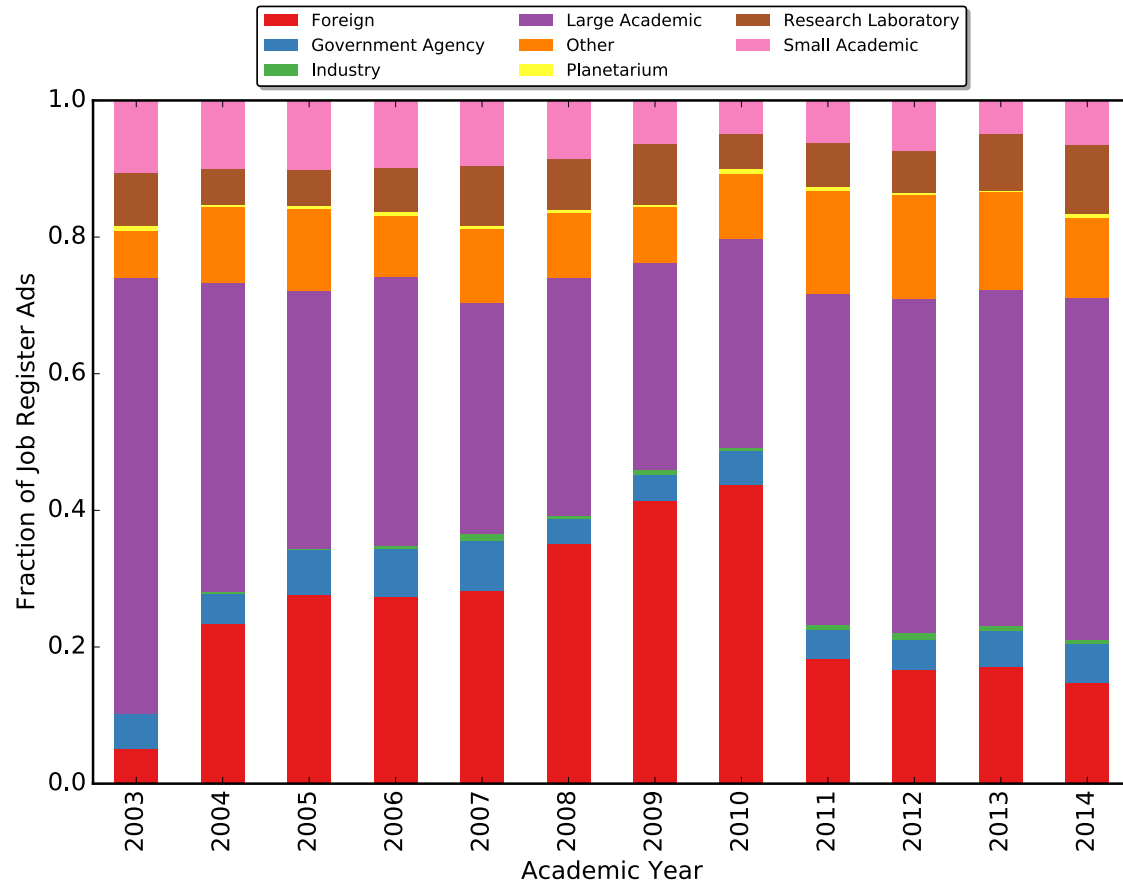
MO =

management/other



AAS Job Register: job posting stats

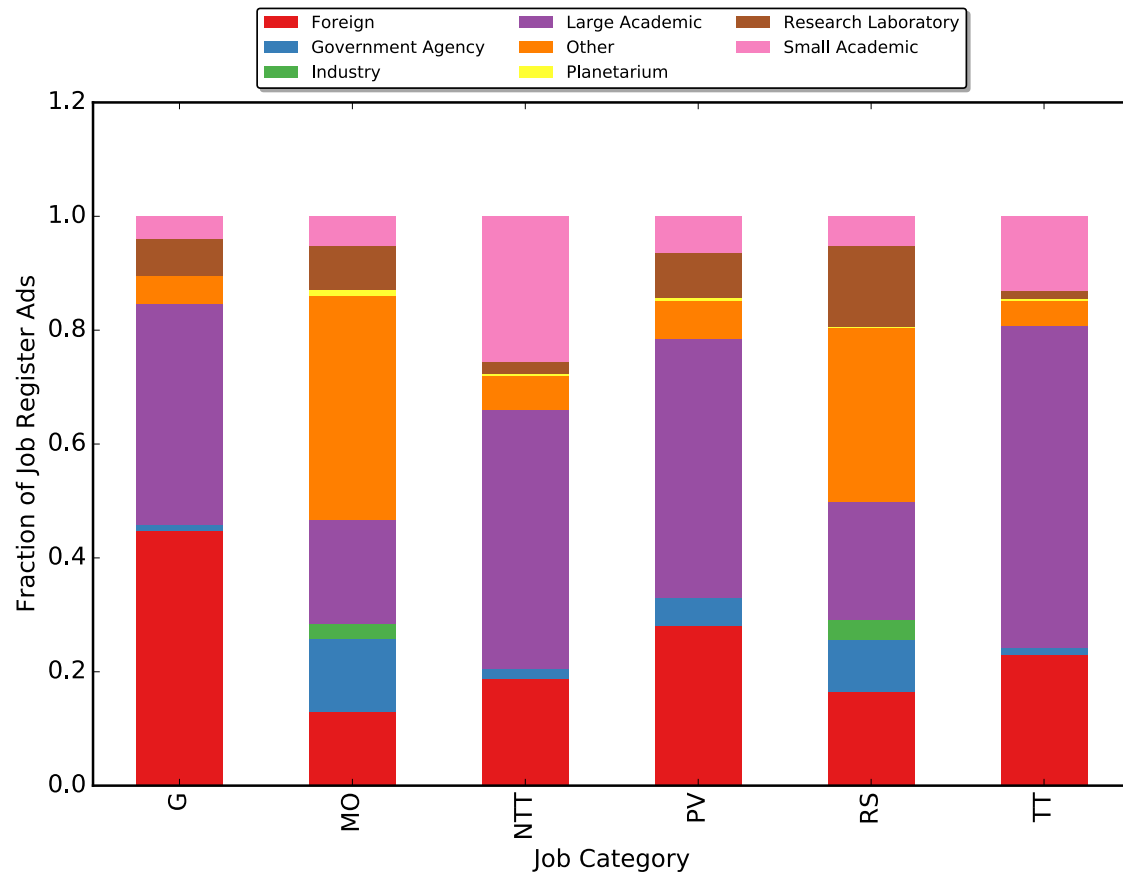
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Statistics on Non-Academic Careers in Astronomy

- Compiled by Rachel Ivie
 - American Inst. of Physics Statistical Research Center
 - Stats/info in next 7 slides presented at 231st meeting of AAS in DC, Jan. 2018
- Sources:
 - AIP data on initial outcomes of recent PhDs, collected within one year of graduation
 - Data collected from AAS members by AAS Demographics Committee
 - 2 surveys, 2013 and 2016
 - Random sample of AAS members in the US (statistically representative)
 - Covers education, employment, postdocs, and demographics
 - Another planned in 2018 [not sure of status]
 - Longitudinal Survey of Astronomy Graduate Students (funded by NSF)



AAS Demographics Committee

- Collected by AIP in 2013, 2016, planned for 2018
- From a random sample of AAS members in the US (statistically representative)
- Covers education, employment, postdocs, and demographics

Next 5 slides: stats from AIP 2018¹⁴ report on initial employment in astronomy

- Rachel says: sign up to receive updates at <https://www.aip.org/statistics>

Home > Programs and Resources

Statistical Research Center

The Statistical Research Center is your source for data on education and employment in physics, astronomy and other physical sciences.

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Women's and Men's Career Choices in Astronomy and Astrophysics
October 2017
- ROSTER**
Roster of Physics Departments with Enrollment and Degree Data, 2016
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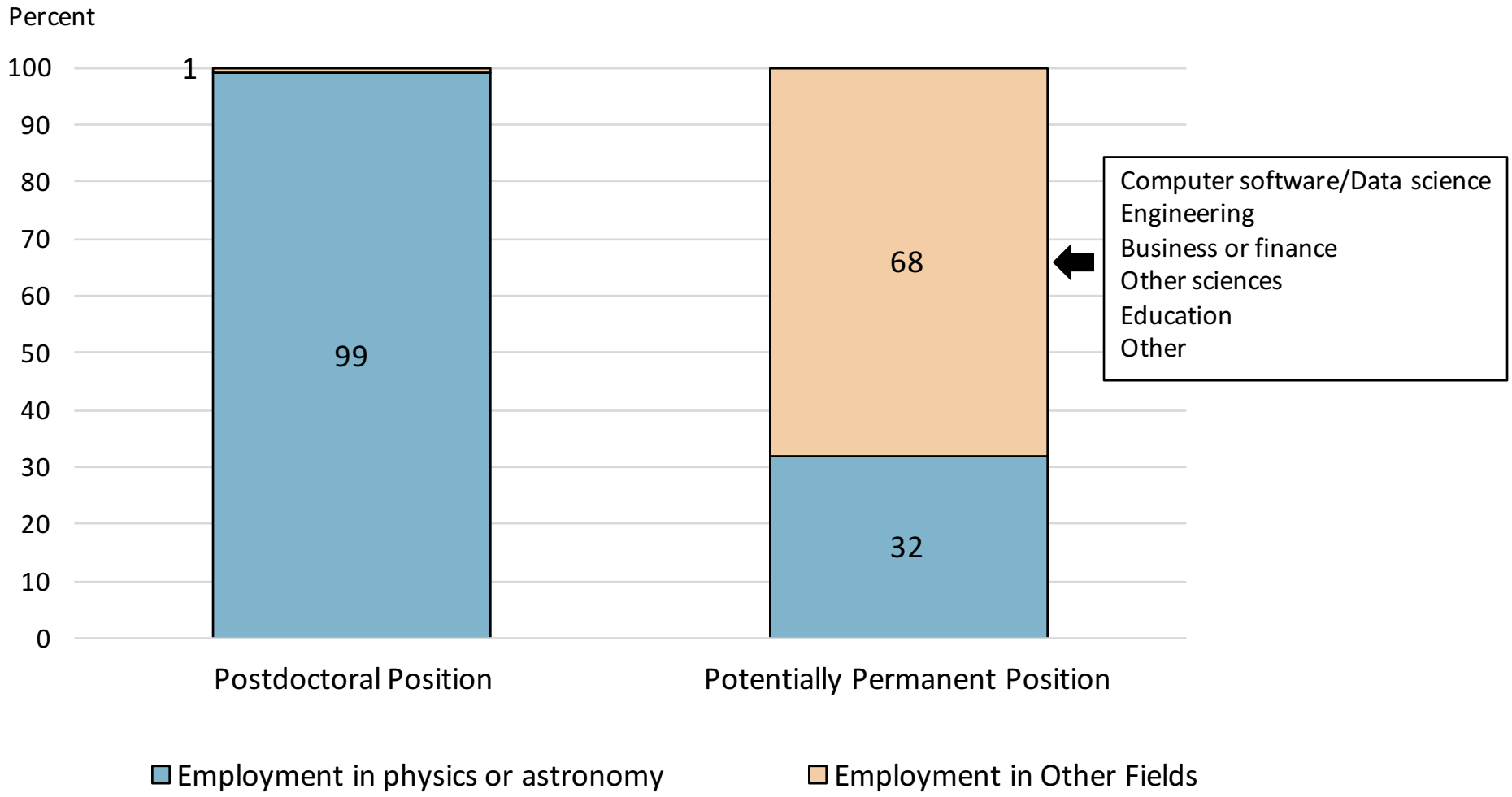
[How to cite and extract our data](#)



Browse data by topic

High School	Employment & Careers
Undergraduate Education	Women
Graduate Education	Minorities
Faculty	International
PhD Plus 10	Astronomy

Employment Field of Astronomy PhDs One Year After Degree Classes of 2015, 2015 & 2016 Combined



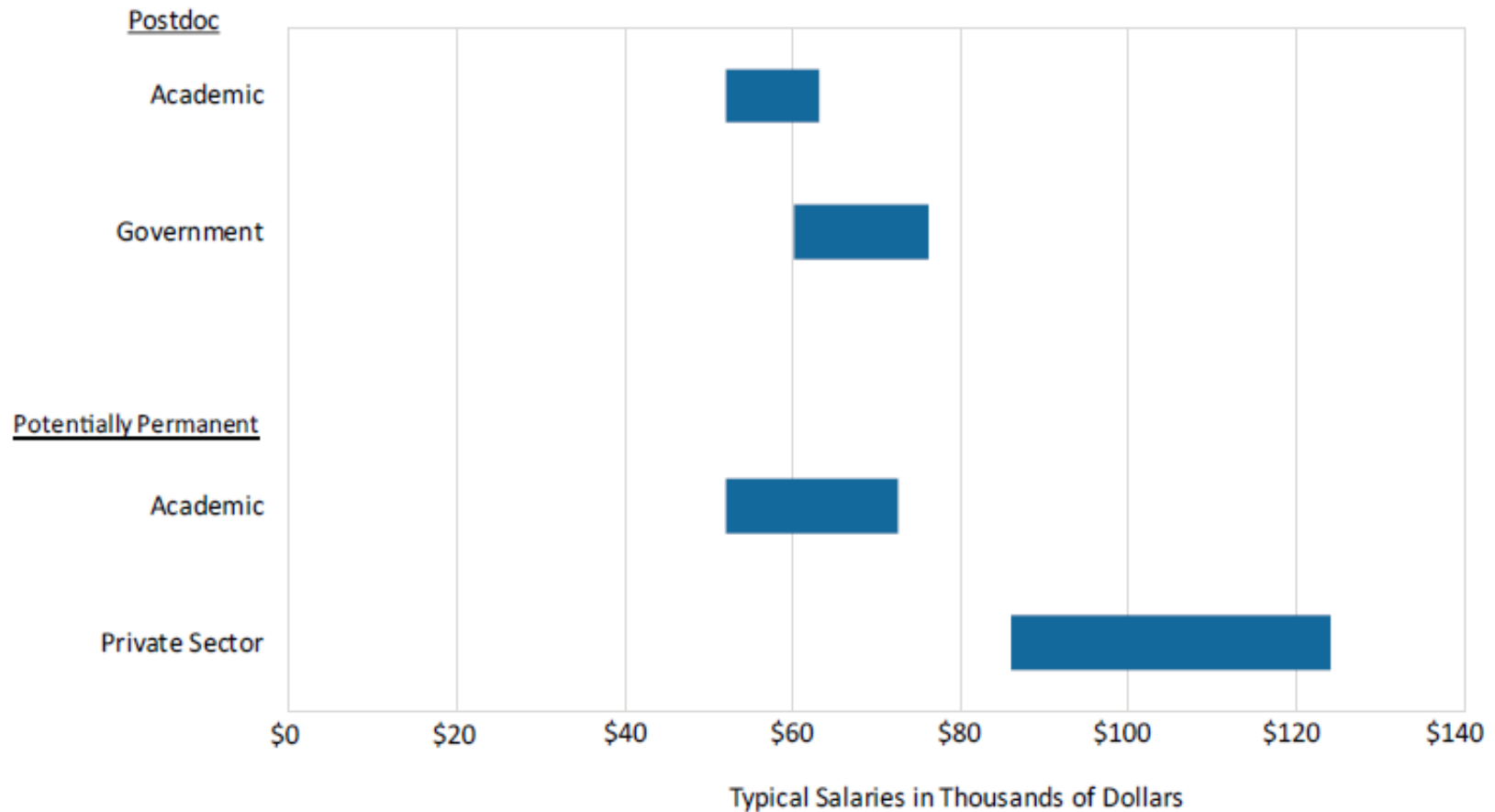


**Type of Employment of Astronomy PhDs by Employment Sector
One Year After Degree, Classes of 2014, 2015 & 2016 Combined.**

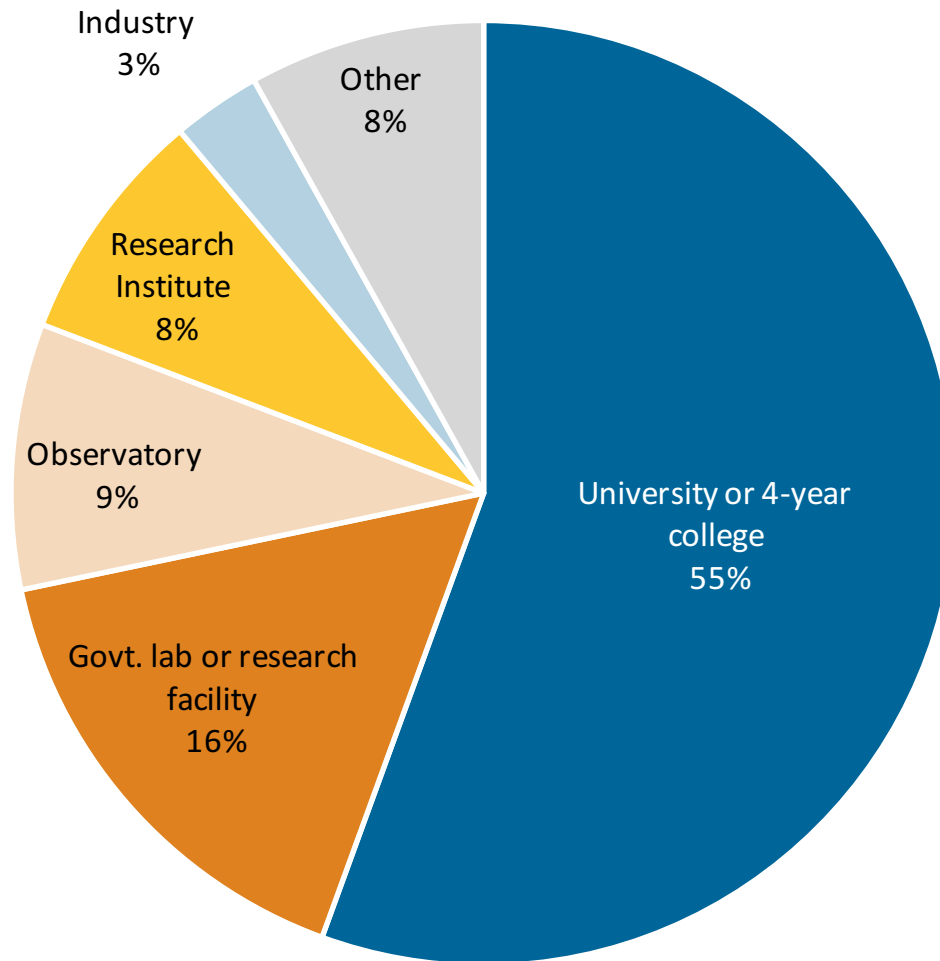
Sector of Employment	Employment Type	
	Postdoc %	Potentially Permanent %
Academic	72	25
Private	2	64
Government	23	8
Other	3	3
	100%	100%

Starting Salaries of Astronomy PhDs, Classes of 2014, 2015 & 2016 Combined.

Sector of Employment



As of Jan 2018: Employer of US AAS Members with PhDs, 2016



Main Activity in Current Job
Of US AAS Members not in Postdocs, 2016

Activity	University, 4-year college		All other sectors	
	%	N	%	N
Teaching	39	238	5	31
Devising, conducting observations	18	112	18	103
Theory, N-body simulations	12	78	5	29
Instrumentation, telescope design	6	35	15	82
Data visualization, mining	5	30	7	37
Education or public outreach	2	14	5	30
Management, administration	1	4	7	41
Multiple activities	4	25	4	22
Data analysis	1	7	2	10
Laboratory astrophysics	1	7	2	9
Other research	2	13	2	10
Software, IT	-	1	3	14
Other	8	52	25	137
Total N		616		555



AIP Longitudinal Survey of Astronomy Graduate Students

- Originally a collaboration between AAS and AIP
- Funded by NSF Astronomy Directorate
- Data collected from people who were in grad school in 2006-07
- Always collected from same group of people
- Collected in 2007-08, 2012-13, and 2015
- Main purpose to document and explain differential attrition by gender
- Has other data available, such as employment sector and field



Employment Sectors, 2012-13

	Never Postdoc	Completed Postdoc
University	47%	61%
Federal agency (not lab)	4%	10%
Observatory	3%	9%
National lab	4%	8%
For profit	19%	6%
Non-profit	4%	2%
UARI	4%	1%
Government contractor	5%	1%
Two-year College	5%	0%
Other	4%	3%
	100%	100%



Previous slide listed some non-academic job “flavors” ...

- National lab (NASA centers, LLNL, NIST, ...)
- Federal agency (NASA headquarters, DOE, ...)
- Science Policy (Dept of State, AAS, AIP, ...)
- Industry
 - Aerospace (Lockheed, Ball, TRW, ...)
 - Imaging (many, many companies...ask anyone at RIT's CIS)
 - Data Science (again, many companies...Amazon, Google, Netflix, WarnerMedia, ...)



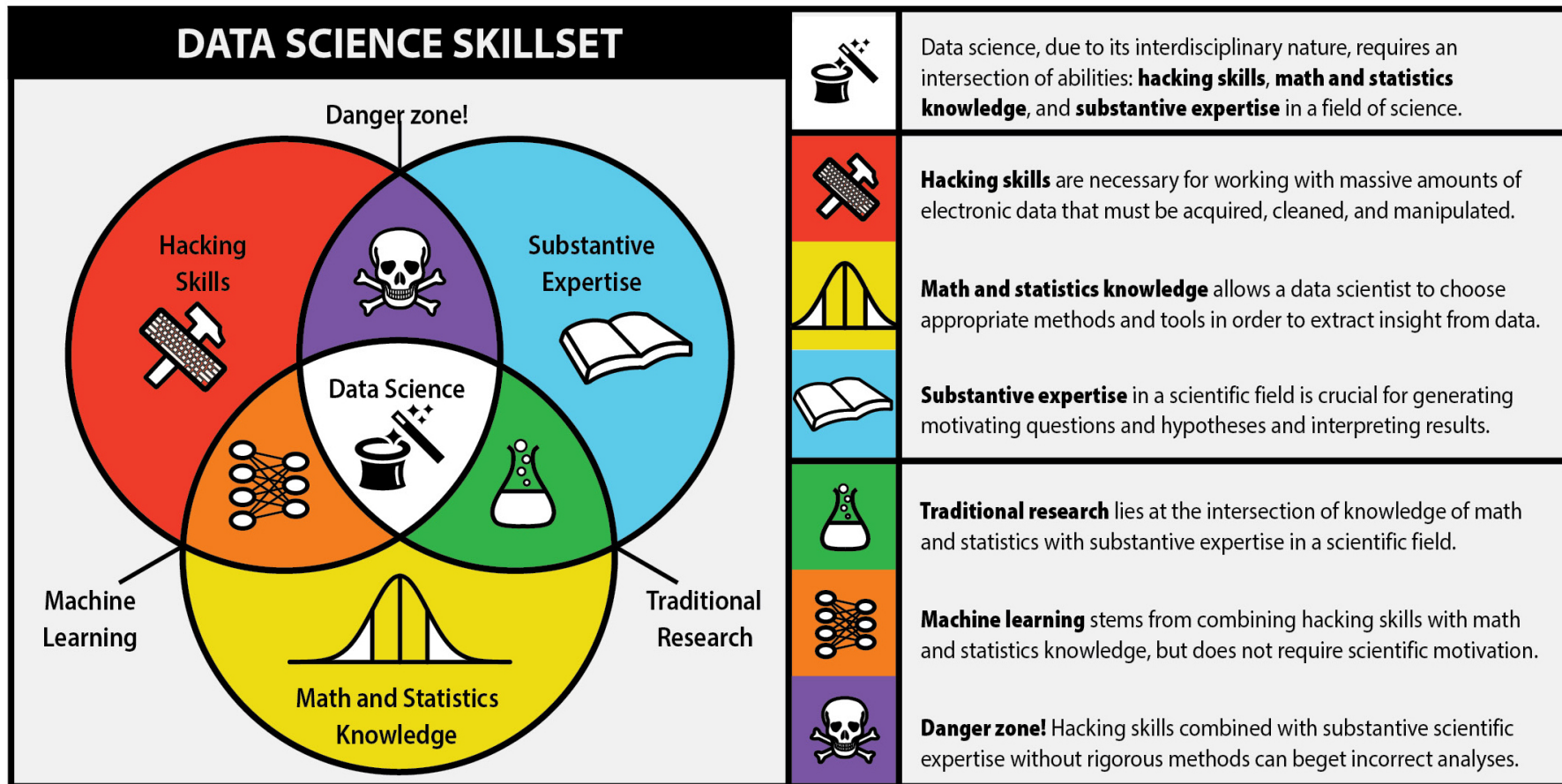
Example: how astrophysics skills translate to a career in data science (courtesy Jonathan Foster*)

* *Astrophysics PhD; now Senior Director of Quantitative Research, WarnerMedia Applied Analytics*

General Skills	Specific Skills
Model data	Hierarchical Bayesian modeling
Write and maintain Python code	Time series analysis
Advise “students”	Image analysis techniques
Keep up with the literature	Natural language processing
Attend a lot of meetings	Network analysis

"HOW TO BECOME A DATA SCIENTIST BEFORE YOU GRADUATE"

<http://berkeleysciencereview.com/how-to-become-a-data-scientist-before-you-graduate/>





Career development workshops/sessions at AAS 233 (Seattle, WA; Jan. 6-10, 2019)

- **Beyond the Academy workshops**
 - **Career Hour: Transitioning to a Career in Data Science (Panel Discussion)**
 - **Round table discussions (w/ “career domain” reps)**
 - Participants will be invited to to choose among -- and circulate among -- the “career path rep” tables as they see fit, sitting down to ask questions or just listening in to the conversation. The first hour will feature the round table event, followed by a 1-hour recruiting event, where job seekers can sign up for interviews with recruiters.
 - **Career Fair (follows round table)**
- **Career Consultant sessions (organized/hosted by Alaina Levine, Quantum Success Solutions)**
 - **One-on-One Career Consultations (20-minute Sessions)**
 - **Careers 101: Career Planning Workshop and Panel for Graduate Students and Postdocs**
 - **Career Hour - Interviewing: What You Need to Do Before, During, and After to Get the Job**
 - **Networking for Nerds: Create Your Dream Career In Real Life (IRL) and via Social Media**
- **Introduction to Software Carpentry (two-day workshop)**
- **How to Build and Publish a Website in 60 Minutes or Less: Developing Crucial Web Development Skills to Meet Professional and Academic Needs in the Digital Age**
- **Proposal Writing: Using NASA ROSES as a Template for Success**