NOTES: Academic and non-academic career paths in astronomy

Big question: if you get an undergraduate degree in astronomy (or physics), what can you do with it?

- Academic careers
    - Step 1 (after undergrad): get PhD
        - Undergrad degree can be in astro, physics, geoscience, etc
            - Most of the time it's astro or physics, but other options are possible if you can clearly explain (1) why you're pivoting or (2) how your past work was related to astro
        - Masters vs PhD
            - In USA, standalone physics/astro masters programs are mostly cash cows; the masters degree will come along with your PhD
            - Recommendation: if you want to do something to prepare yourself for a PhD, do postbac research instead of a masters
            - Much more common to do masters/PhD separately in Europe – some American students get a masters there and come back for PhD
        - What does it look like to be a grad student at Columbia?
            - First two years: take classes (to earn master's degree), TA courses in department (including 1 semester as lead instructor), doing research (two 1-year projects)
            - Next 2-4 years: propose research plan, carry out research, write thesis (much more research focused)
            - In general: Some "service" to department (attending events, having a grad job), outreach/mentorship if desired
    - Step 2: do 1+ postdocs
        - Postdoc = temporary short-term positions (1-3 years, usually)
        - What does it look like to be a postdoc?
            - MOST of your time is spent on research
                - Two main types of postdocs: (1) you are funded by a specific professor to work on a specific topic (2) you have external funding (gov, private foundation) and basically can do whatever you want
            - You can seek out opportunities to teach/mentor, but will (usually) not be expected to do this by default
    - Step 3: become faculty at a university
        - What does it look like to be a faculty member? (How is it different from being a postdoc?)
            - Teaching responsibilities (at least 1 course/year, sometimes 1 course/semester)
            - Mentoring responsibilities
            - Service responsibilities to the university (committees, etc)

                - Transition from being responsible just for your own research to leading a research group (including having to secure funding for that group)
        - Other versions of Step 3
            - Become a staff member at a research institution
                - Public (e.g. NASA) or private (e.g. Carnegie; rare places)
                - What does this look like (compared to being a faculty member)?
                    - No teaching responsibilities!
                    - More time spent on research
                    - Less exposure to students, but mentorship opportunities are usually still plentiful
                    - Especially if at NASA: you might be bound to a specific mission/project
            - Become a research scientist at a university
                - Positions usually aren't officially advertised – often the opportunity arises spontaneously out of a postdoc position
                - What does this look like (compared to being a faculty member?)
                    - More precarious funding situation
                    - Less power in the university structure
                    - No teaching responsibilities
                    - Can still mentor students if desired
        - Some opportunities with just a bachelor's degree
            - Scientific/technical staff positions: varied responsibilities, but usually software development, database management, telescope operation, etc
            - Public-facing/outreach jobs at e.g. planetariums, astronomy departments at institutions, etc.
            - Typically no research time
            - **Example from Job Register**
                - NASA Exoplanet Science Institute Scientific Data Analyst: https://aas.org/jobregister/ad/90177bfb
- Non-academic careers
    - With a bachelor's degree:
        - Careers in tech, data science, etc
        - Examples from friends of the Columbia grad students:
            - Data engineer at United Airlines
            - Writing intern for the Late Show with Stephen Colbert *(although note that she double-majored in creative writing)*
            - Analyst at TD Bank
            - Data analyst for an insurance company
            - Science journalism
    - With a PhD:
        - Lots of transferable skills: project management, coding, etc.
            - Applicable to data science, patent law, public policy, scientific society management, edtech, etc.

        - If you decide to pivot during your PhD, you can mold your experiences to suit what you want to pivot to (e.g. doing more software development if you want to go into tech)
        - Examples
            - Many physics PhDs get recruited into e.g. quant finance
            - Others pivot to climate modeling/science
            - Columbia alumni
                - Moiya McTier (science communication)
                - **Other examples:** **https://www.astro.columbia.edu/content/former-grad-students**
- How can you decide which path you want to take?
    - Need to think about what matters to you!
        - Do you like doing research? (All parts of it, including the writing/soft skills stuff?)
        - Do you want to teach?
        - Do you want to be more public-facing (beyond the “ivory tower”)?
    - You can, of course, ALWAYS pivot no matter what stage you’re at