

Applying for post-doc jobs in astronomy*

(2023 edition)

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*A short, biased guide, based on both
data and personal experience.



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Outline

- Pros & cons of a career in astronomy / academia
- Post-doc jobs
 - Fellowships, PDRAs, etc.
- Logistics - the “job market”
 - How to find jobs
 - Timetables
- How to apply
 - The application process
 - Writing a good job application
- General advice / final thoughts

My career



Cambridge (PhD, '02-'05) ➡➡➡➡➡ Colorado (PDRA, '05-'07)

➡➡➡➡➡ Leiden (PDRA, '07-'09) ➡➡➡➡➡ Leicester (faculty, '09-)

Astronomy careers

Do you want a career in astronomy?

- **Pros:**

- Job satisfaction.
- Opportunities to travel or move abroad.
- Flexible working arrangements and conditions.
- Job security (in the long term - permanent positions).

- **Cons:**

- Short-term instability. Post-doc positions are typically 2-3 years, and usually require you to move (often internationally).
- Slow and messy career structure, with poor job security at earlier stages. Major career “bottleneck” is often in mid-30s.
- Astronomy is largely reliant on state funding (more so than other sciences), so budgets vary due to politics/economy.
- Salaries generally somewhat lower than in private sector.

Career statistics

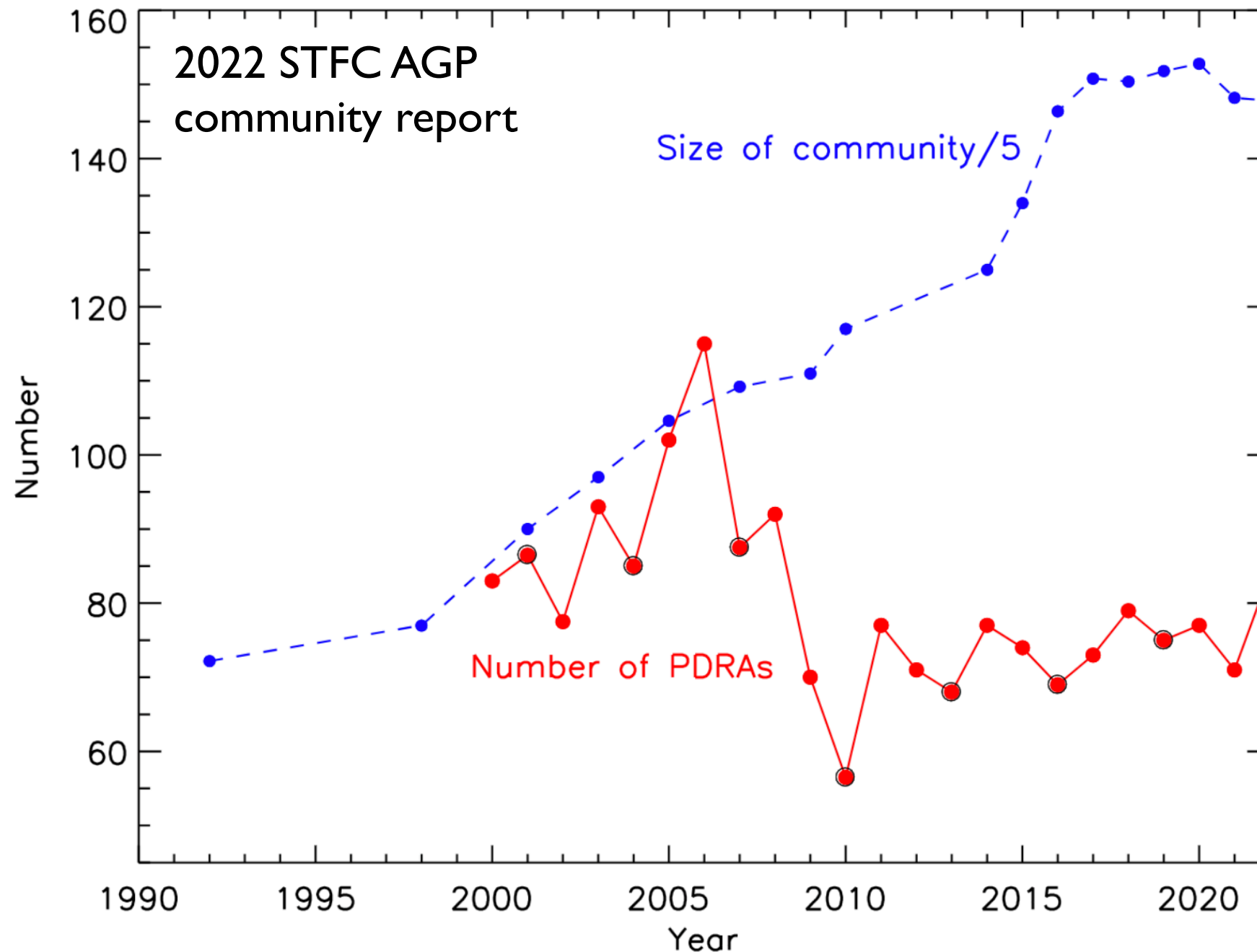
- In the UK, ~50% of astro/space-science PhD students go on to post-doc jobs (~1/2 in the UK, ~1/2 abroad)*.
- Similar numbers for Leicester students, albeit with small number statistics.
- UK career “flux” numbers (positions/year)*:
 - PhD students ~100
 - Post-docs ~50
 - Academic staff ~5-10
- 5-10% of UK students end up in UK academic jobs, plus 5-10% in other astro jobs (non-academic/abroad)*. [But note these stats have long (~10yr) “lead time”.]

*Sources: RAS Demographic Survey (2011); RAS Report on Astronomy Careers (2005); STFC stats.

Career statistics

- Job market has changed greatly in last ~15-20 years:
 - substantial increase in worldwide student and postdoc numbers in '00s (postdocs peaked ~2010; PhDs still increasing).
 - no corresponding increase in the number of permanent (faculty) positions.
- Result has been a big change in career timescales: longer post-doc periods (on fixed-term contracts), and greatly increased competition for permanent positions.
- 2010 US Astronomy Decadal Survey found that the “typical” time spent as a post-doc increased from 3-4 years in late '90s to 6-8 years by the late '00s.
- (Lead time means a lot of statistics are out-of-date.)

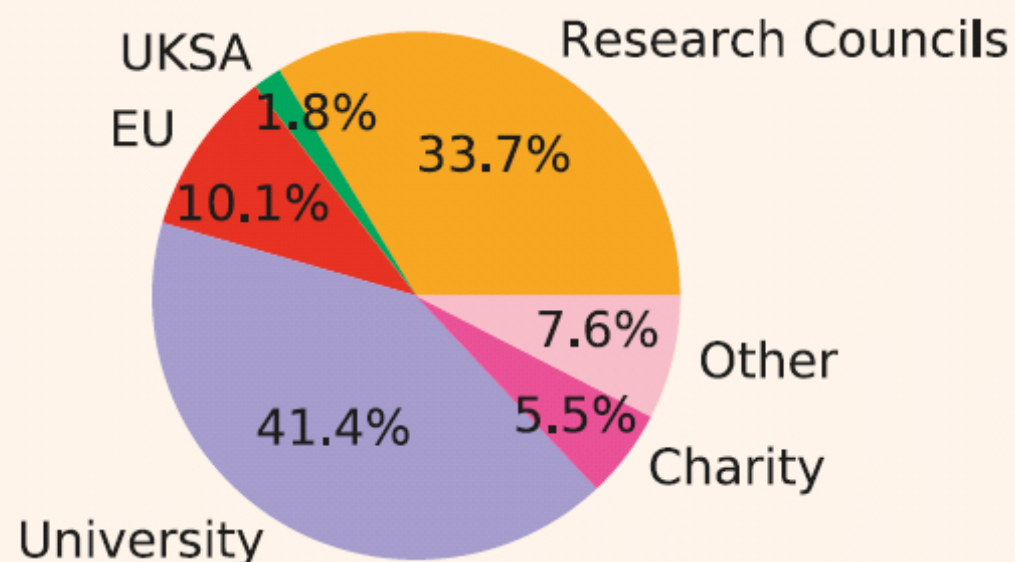
STFC-funded post-doc positions



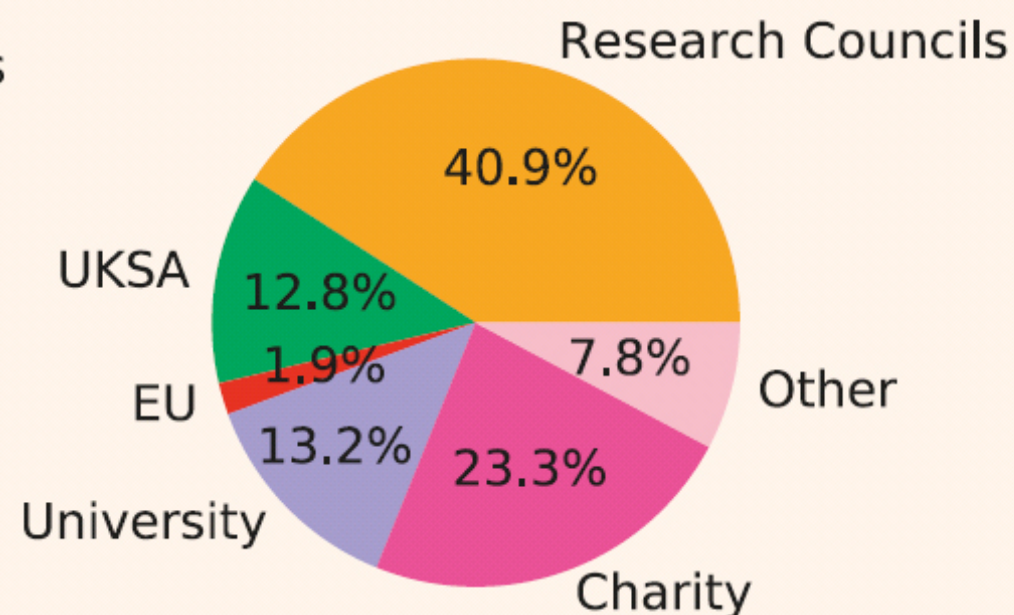
EU funding (mainly ERC) mostly offset the drop in STFC post-doc funding in the 2010s, but UK's status post-Brexit is still uncertain. (UK re-joined Horizon programme in Sept 2023. 🎉)

UK Astronomy Funding Sources

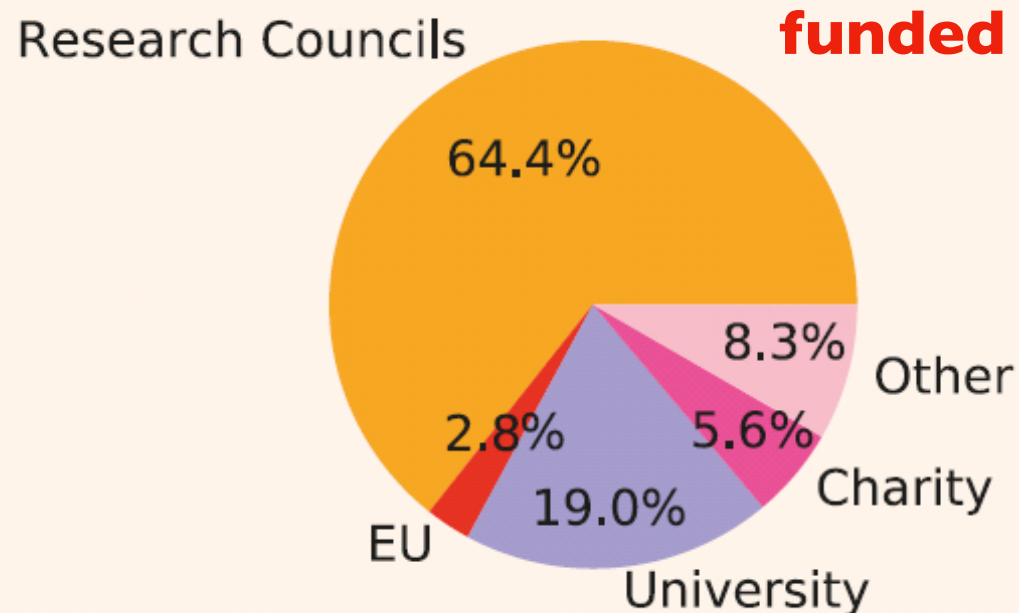
Academic Staff



Research Fellows

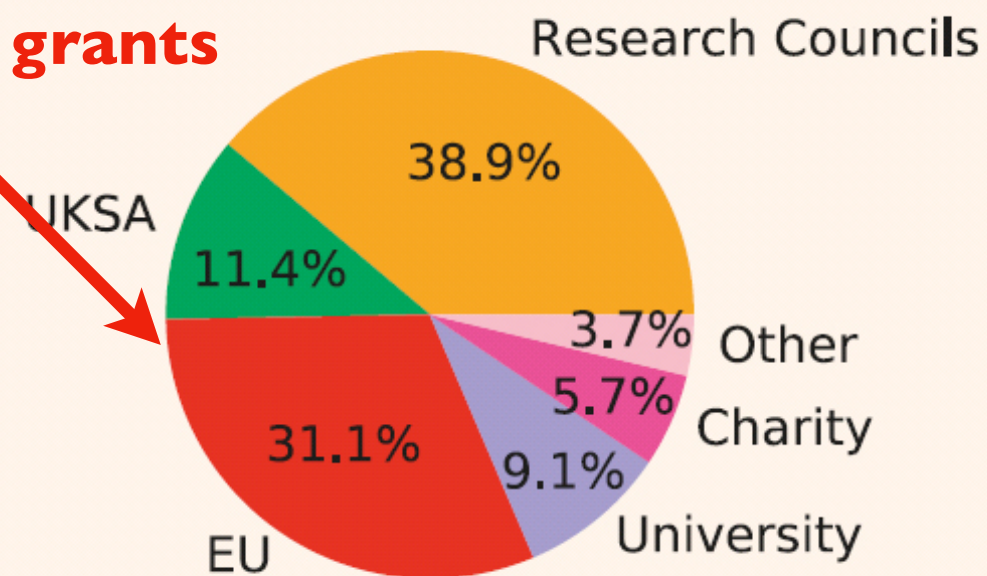


PhD students



**~1/3 of UK PDRAs
funded by EU grants**

PDRAs





- UK universities have standard pay-scale (age/experience). Current starting salaries for post-docs ~£35-40k.
- US/Canadian salaries tend to be somewhat higher, ~\$60-75k. (Always ask about benefits in the US.)
- EU salaries vary substantially: often €45k+ in Netherlands & Germany; can be significantly less in other countries.
- Some jobs (notably ESO & ESA) offer tax-free salaries.
- Other money factors: research budget, moving expenses, benefits (health insurance, childcare, etc.), tax rates.
- For most people, salary differences are not usually a major factor in deciding between post-doc jobs.

Post-doc jobs

Types of post-doctoral jobs

- **Fellowships (to take to institute of choice)**
 - e.g., Hubble, ESA, RAS, etc.
- **Institutional/departmental fellowships**
 - e.g., CfA Clay, Berkeley Miller, CITa, Leiden, etc.
- **Research associates (PDRAs)**
 - most post-doc jobs fall into this category; huge variety.
- **Technical/support positions**
 - usually some time allocated for research.
- **Temp. lectureships, teaching fellowships, etc.**
 - fixed-term teaching posts, usually with some time for research.

Fellowships

- Fellowships carry two major advantages:
 - academic freedom (you work on what you want to).
 - financial independence (you control your own research budget).
 - [may also carry more prestige/recognition]
- Also some disadvantages:
 - competitive.
 - require self-motivation (no supervisor to tell you what to do).
 - may not always be well-supported by host department.
- “Open” fellowship applications (e.g., Hubble, RAS, ESA) require endorsement of host institution.
 - must contact departments well (weeks) before deadlines.
 - suitability of host department sometimes a factor.

Named Fellowships (examples)

- **Hubble.** Any US institute; (almost) any field. **2 November**
- **ESO.** Garching or Chile; 25% service. **15 October**
- **NWO Veni.** Any Dutch institute, all science. **5 September**
- **Humboldt.** Any German institute, all science. **(no deadline)**
- **“I85I”.** Any UK institute, all science. **?? January**
- **RAS.** Any UK institute (with no current fellow). **Not in 2023**
- **5I Peg b.** Selected US institutes, exoplanets. **6 October**
- **etc., etc., ...**

Institute Fellowships (examples)

- **STScI Fellowships** **6 October**
- **CfA: Clay/Post-doc** **28 October**
- **Carnegie Fellowships** **30 October**
- **Caltech Burke Fellowships** **15 November**
- **MPIA Fellowships** **30 November**
- **Cambridge: Kavli** **16 Oct / 1 Nov / 15 Dec**
- **etc., etc., ...**

Research Associate Positions

- “PDRA” = any job funded through someone else’s grant.
- PDRAs account for the vast majority of post-doc positions.
- Employed to work on specific project(s), but huge variety:
 - some PDRAs offer near-complete freedom in research.
 - others are highly targeted and/or project-specific.
- Pros:
 - motivation provided by supervisor.
 - projects already exist - can lead to many papers (quickly).
 - opportunity to branch out from PhD project (with expert supervision).
- Cons:
 - can be harder to establish independence.
 - may be less scope/time for working on your own ideas.

Technical/support positions

- Usually linked to facilities:
 - ESO (Garching & Chile), UKATC, ESA, etc.
 - telescopes (Hawaii, La Palma, XMM, Swift, etc.).
 - computing (data centres, super-computers, group positions, etc.).
- Pros:
 - gain experience (both technical and management).
 - can benefit research career in short-term.
 - in longer term can lead to “new” direction (e.g., instrumentation).
 - “lifestyle factors” (often generous tax breaks, allowances, etc.).
- Cons:
 - limited time for research.
 - can limit future options (in some cases).

The astronomy job market

When to apply

- This is the start of “job season” for astronomy post-docs.
- AAS enforces a decision deadline of **15th February**.
 - no US institution can ask post-docs for decisions before 15th Feb.
 - not enforced elsewhere, but many non-US institutes operate to roughly the same timetable.
 - result is that majority of astro post-doc jobs have deadlines Oct-Jan.
- For jobs starting in autumn 2024, **apply now!**
 - if you wait until after Christmas you will miss out on many options.
 - still allows you to apply for “out-of-season” jobs if necessary.
- Major resources for job ads:
 - **AAS Job Register** - jobregister.aas.org
 - RAS Jobs mailing list (email subscription)
 - Rumour mill (hosted by astrobetter.com)

What to apply for


- Best to apply for a range of jobs - fellowships & PDRAs.
 - Don't rule things out too quickly - a change can be good. (Also, when the alternative is no job at all...)
 - However, don't apply for jobs that you really don't want.
 - Ask your supervisor (and other people) for advice.
 - You won't get any job you don't apply for....
 - ...but be realistic.
-
- Be aware that many people apply for lots of jobs: 30+ applications is not unusual. (I did ~20 each time.)

In the UK...

- Few UK post-doc fellowships, which means limited options for independent early-career researchers.
- No STFC scheme, but other options do exist:
 - “I85I” fellowships.
 - ~~RAS fellowships (no call in 2023)~~
 - Cambridge/Oxford college fellowships (“JRFs”).
 - some named university fellowships (usually open to all science).
- ~30% of recent UK astro PDRA jobs funded by the EU (mostly ERC). Should(?) continue now UK is back in Horizon.
- Expect a few tens of PDRA positions to be available:
 - Currently only ~5 UK PDRAs on AAS Job Register, but most UK jobs not advertised until after STFC grants announced (Nov/Dec).

Writing job applications

Applications typically require:

- [Covering letter/email]
 - **CV**
 - **List of publications**
 - **Research summary**
 - **Research proposal**
 - **Reference letters**
 - [Statements on outreach, impact, teaching, etc.]
 - Talks / Interviews (if short-listed)
- 
- Statement of
research interests**

Covering letter/email

- Say:
 - who you are (include contact details).
 - what job you are applying for (with reference number).
 - your background/interests, why you are applying.
 - names and contact details of referees (including email).
- Be brief and to the point.
- First impressions can be important!

CV

- Include:
 - Name & contact details (also citizenship)
 - Academic record from first degree onwards (“PhD expected...”)
 - Research experience / skills
 - Awards / grants / prizes
 - Invited talks (departments & conferences)
 - Teaching experience
 - Outreach / public understanding work
 - (Career breaks)
 - (Languages)
- Omit:
 - Pre-university academic record.
 - Details of jobs outside the field (unless relevant), external interests.
 - Any long chunks of text!
- Should be no more than 2 pages.

CV (alternative)

- Some jobs/funders (including UKRI) now ask for a “narrative CV”, where you’re asked to fill in a form with free-form text boxes (explicitly prose rather than bullet-points).
- Aim is to standardise formats and allow people to express a broad range of skills / experience, rather than leaving it open.
- As an applicant you’re basically aiming to get the same information across, but in a different (specified) format.
- My main advice about these from a reviewing perspective: make it easy for readers to find all the key information.

List of publications

- Separate refereed & non-refereed.
- Reverse chronological order is standard (most recent first).
- For each paper give title, authors and reference.
- Include “in press” and “submitted” papers.
- “in prep” is a maybe (1-2 can be useful; lots is bad).
- Can include conference talks & posters.
- May wish to highlight your name in (long) author lists.
- Providing web links to papers is a good idea.
[Links to ADS/arXiv publication lists will be greatly appreciated by potential employers!]

Letters of reference

- Usually 2-3 required (often can't all be from same institution).
- Who to choose?
 - your supervisor
 - other collaborators
 - people who know your work well
 - head of group/dept or other “VIP”
- Discuss this with your supervisor (and the referees). Best choice of referees may not be the same for all jobs.
- Ask referees in plenty of time (i.e., a few weeks, not days).
- Provide them with information: where to send letter, job details (link to advert), copies of your application materials.

Research statement / proposal

- Usually one document - “statement of research interests”. Sometimes split into two - summary + proposal (fellowships).
- Typically 3-4 pages, sometimes shorter.
- Should be accessible to a non-specialist.
- Important, especially if you haven’t published much yet. Main chance to “sell” your skills/experience to employers.
- Tips
 - include figures
 - remember your audience
 - balance of details and big picture
 - follow the rules: fonts, margins, Letter/A4 paper size, etc.

Talks / Interviews

- Panel interviews required for some fellowships.
 - Format is typically short (~10 min) presentation followed by questions.
 - Panels are broad. May not be anyone from your field on the panel.
 - Questions can be quite wide-ranging (ask previous candidates for tips!).
- Less formal interviews more common for PDRAs (often via Zoom, especially for international jobs).
 - Wide variety of formats depending on person/group/department.
 - Two-way process. Do you want to work for/with this person/group?
- Also common to visit the department and give a talk.
- A little planning can go a long way.
 - Surprising how many candidates haven't thought about answers to obvious/basic questions (like "Why do you want this job?").

On proposal writing...

- Proposals are difficult to write well, especially the first time. (Ask friends/colleagues for good/successful examples.)
- Job/grant proposals are **not** papers. In many ways a proposal is closer to a sales pitch than an academic article.
- You're writing about **YOU**; the science is a “sub-plot”.
- Tailor it to your audience: a proposal for a non-specialist panel should be very different from a targeted PDRA application. (In particular, beware of field-specific jargon!)
- Ask for criticism (the more, and more diverse, the better).
- Always remember that employers will read tens/hundreds of these. Important to capture interest, stand out from crowd. Make them want to hire **you**.

On proposal writing...

- Proposal writing is a skill, and like any skill it takes time and practice (no-one is “naturally” good at it!).
- Can seem like a chore, but is also an opportunity: chance to take stock, assess where your research is going, and to think of new ideas.
- You should aim for your proposal to be “compelling”. You want the panel to feel bad if they don’t give you the job.
- Need to make a case for both you and the science. (“X is the most interesting project, and I am the best person to do it.”)
- For fellowships, important to convince panel that you will get results in 2/3/5 years. Project time-line is a useful “trick”.
- Expect to re-write and polish proposals many times.

Raising your profile

- **Be seen!**
 - Try to go to conferences in the run-up to job season.
 - Ask about giving talks in other departments. (They might even pay.)
 - Talk with everyone (visiting speakers, conferences, etc.). It never hurts to have people remember you and/or your work.
 - If applying to the US, consider the January AAS meeting (or DPS).
- **Get your work noticed:**
 - Conferences, seminars; also talks by your supervisor.
 - Try to get papers out (at least on arXiv) before job deadlines.
- **Set up a website** (potential employers **will** Google you):
 - Single source for info is good. But a bad website worse than none at all.
 - [see Matt Kenworthy's advice on setting up a professional web-page.]
- Always think of the big picture - why is your work important?

Final thoughts

- Job applications can be daunting, but they don't have to be.
- Applying for post-doc jobs can be **very** time consuming.
 - start soon, expect to spend weeks on applications.
- In general, if you want a career in physics/astronomy then variety is a positive factor:
 - important to demonstrate independence (especially from supervisor).
 - a broad range of interests is usually important in the long-term.
 - having worked abroad sometimes viewed as a positive.
- Try not to take the process too personally.
 - job market is somewhat stochastic, especially early in careers. Also, *everyone* gets rejected at some point (usually many times).

Acknowledgements

- This talk stems from a similar talk given when I was a student (by Steve Smartt in 2004, and then Dave Alexander in 2005).
- I've also collected info & opinions from several similar sets of slides on the web (in particular by Paul Hewett, Sera Markoff, Hiranya Peiris & Matt Kenworthy).
- Over time many other UoL people have provided useful input: Kiri Rhodes, Rhaana Starling, Sean Farrell, Chris Power, Mike Goad, Mark Wilkinson, Nial Tanvir, Andrew Blain, Sarah Casewell, Jim Hinton, Richard White, Stuart Muldrew, Chris Nixon, Matt Burleigh, Stephen Fendyke, Leigh Fletcher, Cass Hall, Bec Nealon, Emma Bunce, Suzie Imber, and others.