

Applying for post-doc jobs in astronomy*

(2023 edition)

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



UNIVERSITY OF
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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

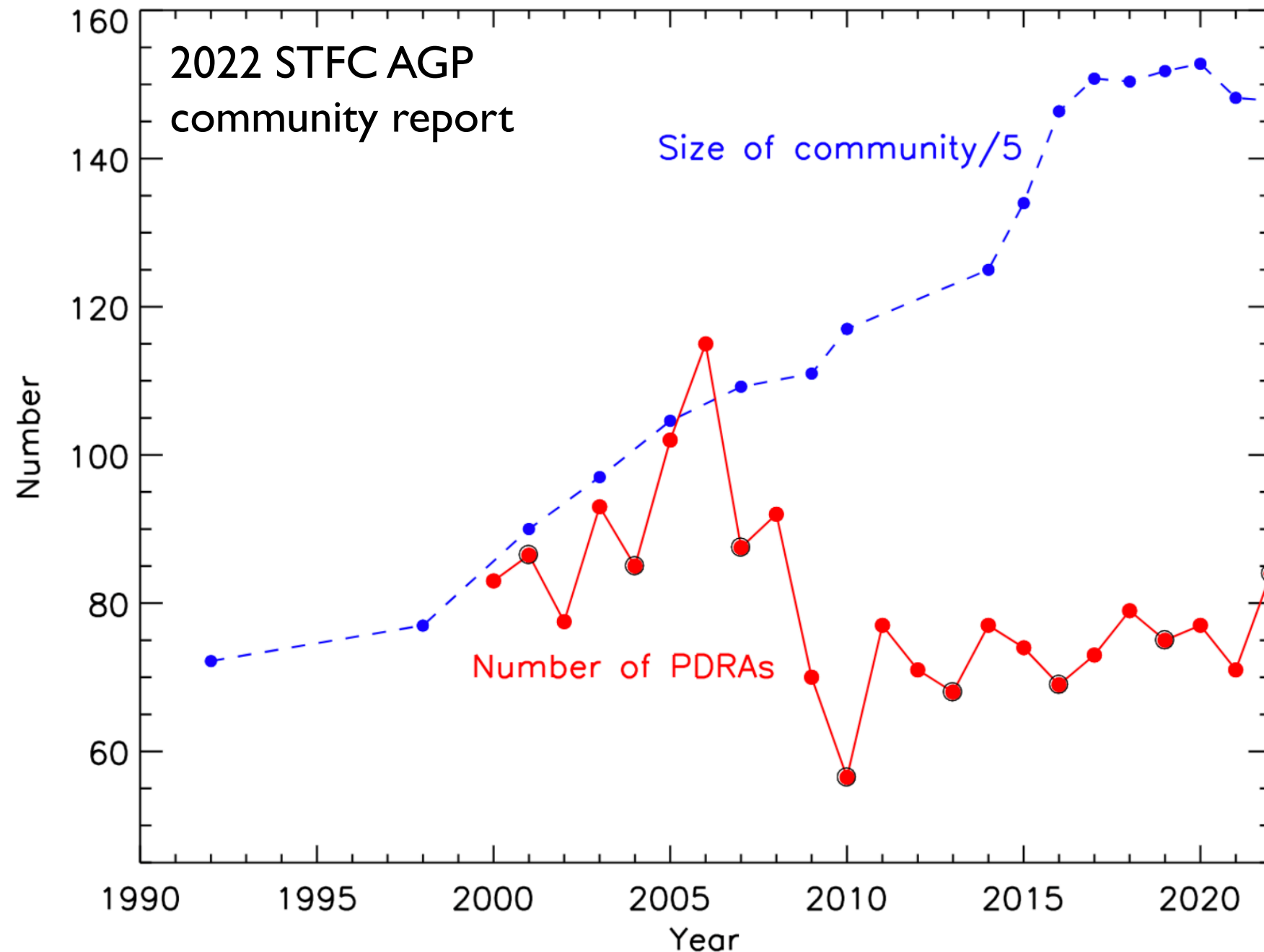
- In the UK, ~50% of astro/space-science PhD students go on to post-doc jobs (~1/2 in the UK, ~1/2 abroad)*.
- Similar numbers for Leicester students, albeit with small number statistics.
- UK career “flux” numbers (positions/year)*:
 - PhD students ~100
 - Post-docs ~50
 - Academic staff ~5-10
- 5-10% 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.)

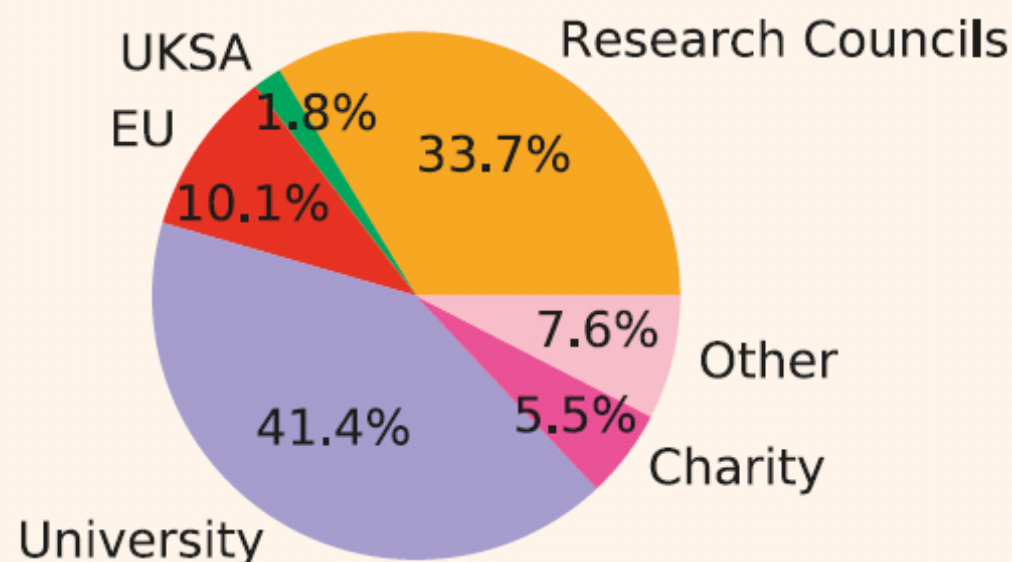
STFC-funded post-doc positions



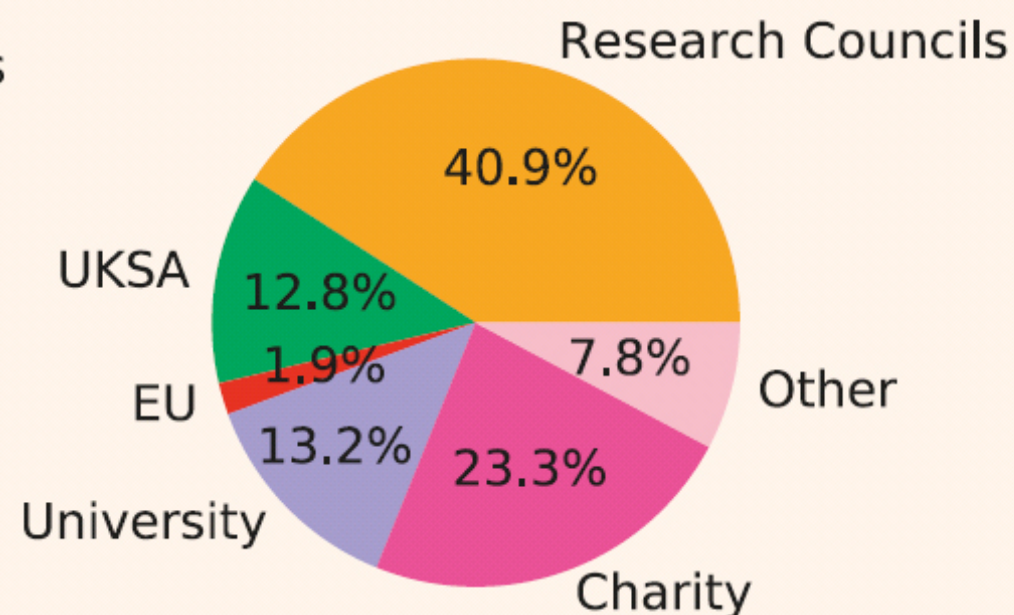
EU funding (mainly ERC) mostly offset the drop in STFC post-doc funding in the 2010s, but UK's status post-Brexit is still uncertain. (UK re-joined Horizon programme in Sept 2023. 🎉)

UK Astronomy Funding Sources

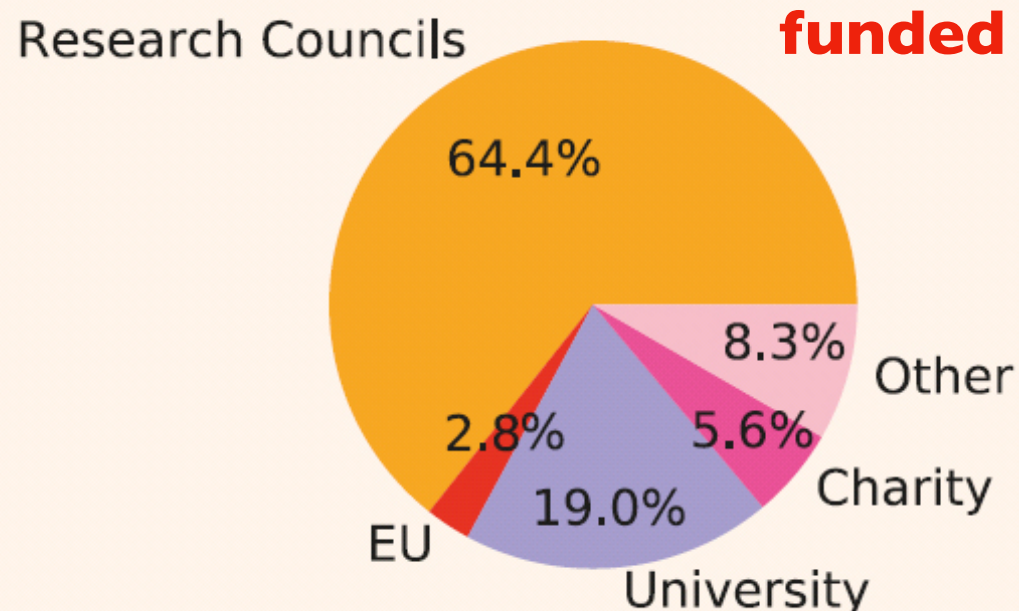
Academic Staff



Research Fellows

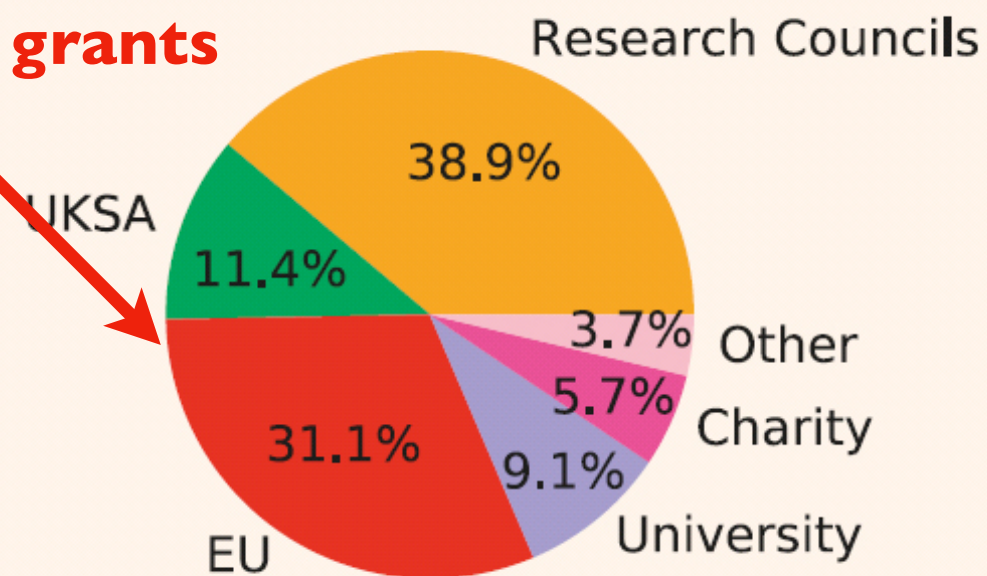


PhD students



**~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. **?? February**
- **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)

- **Cambridge: Kavli** **?? October**
- **CfA: Clay/Post-doc** **28 October**
- **STScI Fellowships** **6 October**
- **Caltech Burke Fellowships** **15 November**
- **Carnegie Fellowships** **30 October**
- **MPIA Fellowships** **?? November**
- **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 2023, **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).
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