

# The Job Application

---

*Florian Rodler*  
*ESO Chile*

*(including material / input from Claudia Paladini, Evelyn Johnston, Jonathan Smoker, Fuyan Bian, Pedro Figueira, Juan Carlos Muñoz, Henri Boffin, Glenn v. d. Wel, Eric Ensellem)*



# What do I like most?

Academia (teaching & research)?

Outreach, science journalism?

Observatory?

Management?

Stable life? Outside astronomy?

Pure research?

Instrumentation?

## What do I like most?

**Be honest to yourself** – find out what you really want

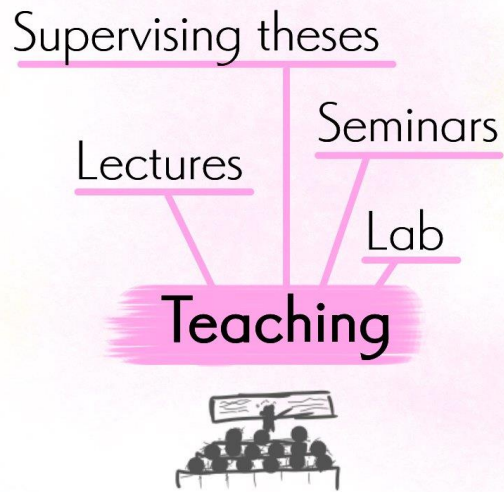
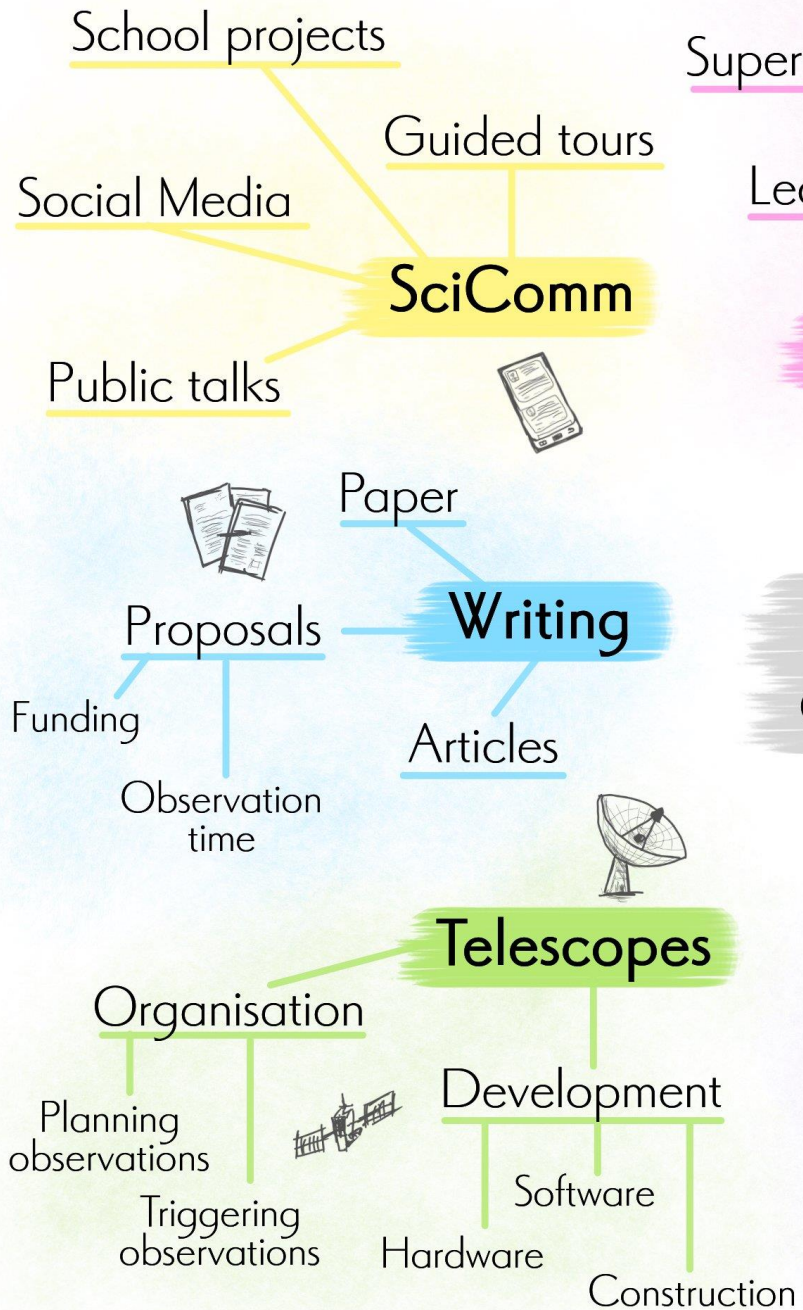
- Think hard why you really want *that* job. What is your real driver?
- What is your long-term goal? Dreams vs reality.

**Know thyself** – be aware of your strengths and weaknesses

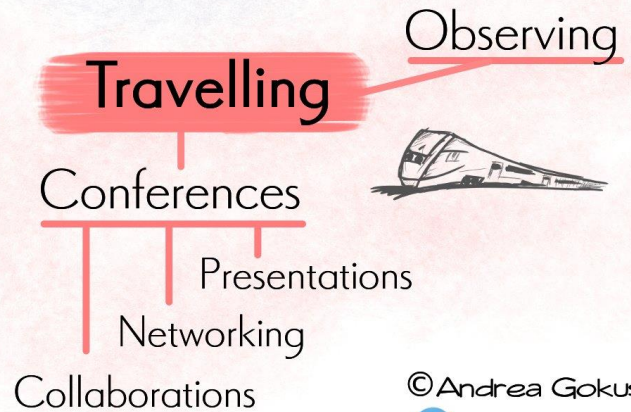
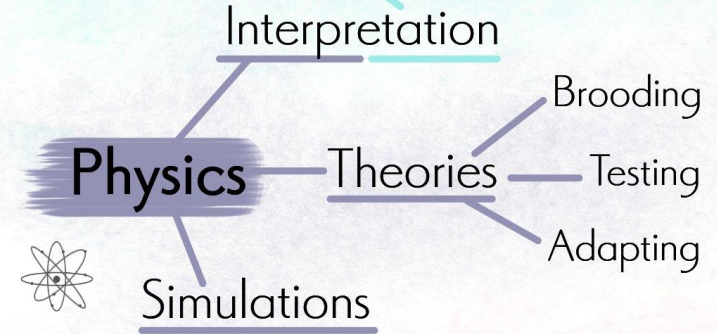
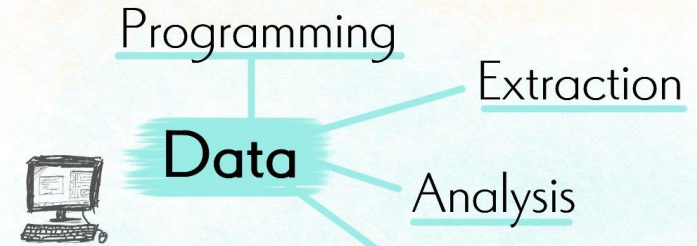
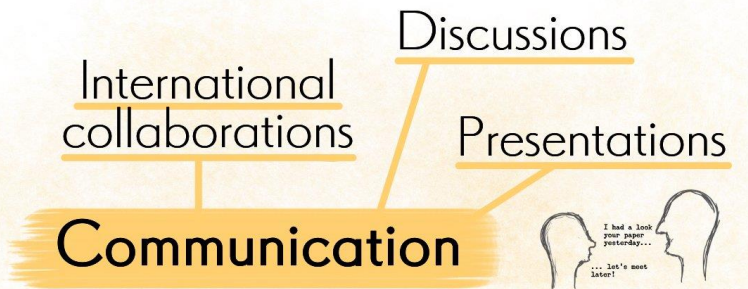
- Ask colleagues, collaborators and supervisors for feedback



# Remember your skills



# Things an astrophysicist does





## Remember your skills:

- Problem-solving oriented person
- Project management
- People management
- Team working
- Finance/budget management
- Communication skills (to technical and non-technical audience) & Teaching
- Technical expertise
- Computing and programming
- International experience
- ...



# Tenure-track positions ...

You may feel that you are not ready / qualified to apply for a (tenure-track) job yet ...

**... but employers may see this differently.**

# Tenure-track positions ...

You may feel that you are not ready / qualified to apply for a (tenure-track) job yet ...  
**... but employers may see this differently.**

**Start early to apply for tenure-track positions** (after 1-2 years of postdoc)

- Independence, collaboration network
- Even if you don't get the job, it's may be a very good training ground (feedback!)
- Remember: Tenure-track position usually come with duty load (teaching, observatory, ...)





## Tenure-track positions ...

If you wait long, you will compete with excellent junior candidates ...

If you start very early, you will compete with more experienced candidates ...

**“To be able to win the game, you have to play it.”**



# Where to look for job ads



# Where to look for job ads

- <https://aas.org/jobregister>



**AAS Job Register**  
Find and post astronomy related jobs!

AAS Home | AAS Job Register Home | Member Directory

**Jobs**

- Current Job Ads
- Query Job Ads
- Archived Job Ads
- Log In To Post Job Ad
- Create Job Poster Account

search this site

**AAS Employment and Career Pages**

- How to Post a Job Ad
- AAS Publication Policy
- AAS Copyright & Permissions
- AAS Career Resources
- AAS Career Center
- Internships & Summer Jobs
- Job Register Editorial
- Tips for Successful Recruitment

**Current Job Ads**

- **Faculty Positions (visiting & non-tenure)** — Time limited position at a university or college. Includes teaching responsibility.
- **Faculty Positions (tenure & tenure-track)** — Permanent (or leading to a permanent) position at a university or college. Includes teaching responsibility.
- **Pre-doctoral/Graduate Positions** — Typically associated with a Fellowship or other source of funding to support those seeking a degree from an institution of higher education. May also include funding opportunities for exchange programs or other professional development.
- **Post-doctoral Positions & Fellowships** — Typically located at a university, college or government lab. Allows recipient to pursue independent research or research support for a specific science program defined by the employer. Is limited to a pre-determined period of time. Usually does not include teaching responsibilities.
- **Science Engineering** — Instrument design and development, software development, IT system support, and other project related responsibilities. Open-ended duration of employment.
- **Science Management** — Runs projects and programs at universities, government or private industry. Open-ended employment.
- **Scientific/Technical Staff** — Includes researchers at science centers, government labs, university, or private industry. May include both user support or project related work and time for individual research. Open-ended duration of employment. Usually does not include teaching. May or may not require PhD.
- **Other** — Any position that does not seem to fit.

**Faculty Positions (visiting & non-tenure)**

Title ↓	Institution/Organization ↓	Location ↓	Posted ↓	Deadline ↓	Position Status ↓
<b>New!</b> Visiting Assistant Professor (Astronomy)	Albion College	Albion, MI	2020/10/24	2020/11/27	Accepting Applicants
<b>New!</b> Part-time Faculty - Astronomy	El Camino College	Torrance, Ca	2020/10/24	2020/11/21	Accepting Applicants
Assistant Professor, Teaching Stream -	University of Toronto				Accepting Applicants

**Welcome**

Username \*



## Where to look for job ads

- Science newsletters (ESA, national funding agencies ...)
- Ask around; use your network to hear about jobs

## Where to look for job ads

If you have a great science idea, there are opportunities to fund your research project:

- Marie Curie Fellowship (Europe)
  - Sagan-, Hubble-, Princeton Fellowship et al. (US)
  - European Research Council (ERC) grant, starting 2 yrs after PhD
  - Alexander-von-Humboldt Fellowship (Germany), up to 4 yrs after PhD
  - Tenure-track programs: Ramón y Cajal (Spain), CNRS (France), ...
- ... and many, many others ...

# Job opportunities at ESO

- **ESO Studentship (PhD students)**

- Duration: 6 months up to 2 years
- You need a supervisor at ESO (in addition to your supervisor at home university)
- There are two annual application deadlines: on April 20th and October 20th.

Check the ESO science pages (scan QR codes below) for potential supervisors at ESO and contact them well in advance!

ESO Chile



ESO Europe



# Job opportunities at ESO

- **ESO Chile Postdoctoral Fellowship (Santiago / Paranal)**
  - 4 years (3 years with observatory duties and 1 year 100% science time)
  - Observatory duties: 80 nights per year support astronomer on Paranal or ALMA (= 50% of the working time, the rest science time)
- **ESO Europe Postdoctoral Fellowship in Garching (Munich)**
  - 3 years with 25% duties in User Support Department or 40 nights per year support astronomer on Paranal

**Annual application deadline: Oct 15<sup>th</sup>**





# Preparation is key



# SHOW YOUR FACE

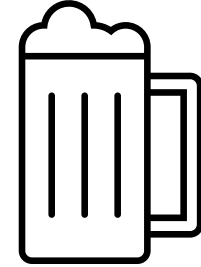


***Remember: You shall not underestimate the fruits of networking!***

## Make yourself visible:

- **Go to conferences, interact; don't hide!**

- *The best collaborations are started in pubs.* 😊



- **Visit potential workplaces beforehand**

- *Do talk tours, give (online) seminars, meet potential employers ...*

You don't wanna be applicant #53.

The more people know you, the higher the chances  
of getting the job you really want!

## Do you homework:

- **Find out more about the research group**
  - *Are they active and well embedded? Publications?*
  - *Access to data & telescopes? Data available?*
  - *Active collaborations?*
  - ***Can they open doors for you? Good mentor?***

***You want a good job (afterwards), not a dead end!***



## Do you homework:

- **Find out more about the institute**
  - *What is their mission, their goal?*
  
- **Identify potential collaborators there**
  - (or people who worked there in the past)*
  - *You may want to contact them (but don't pester them)*



## How you **don't** get a job:

- Don't read the job ad.
- Send a boilerplate application to save time.
- Reviewers love packed documents! Use font size 8 so you make sure that every detail is in your application.
- Be vague. Express doubts about yourself and your project.



## How you **don't** get a job:

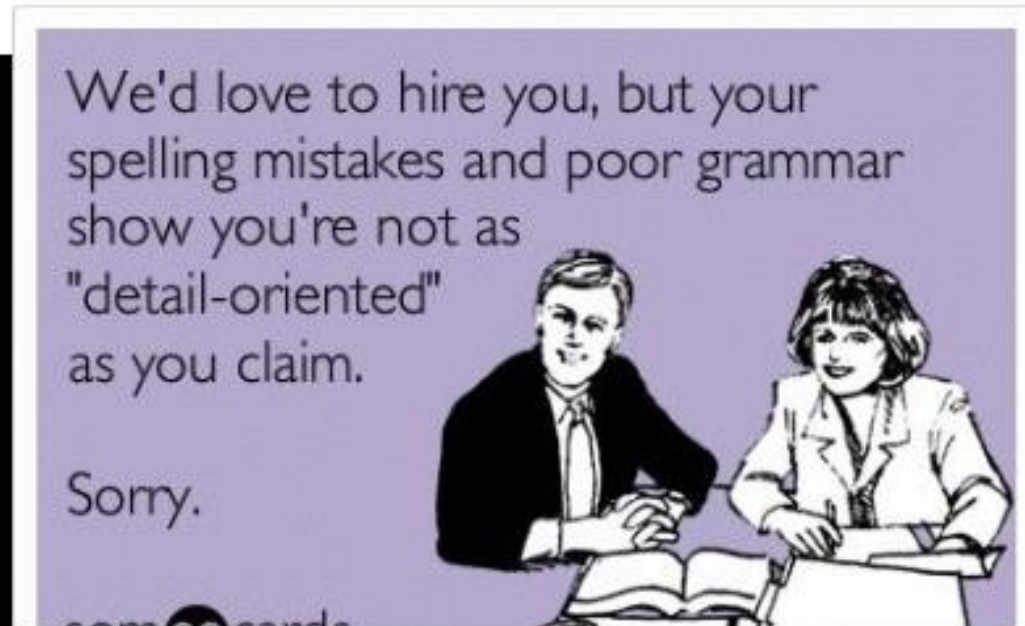
- **Assume** that the reviewers are experts in your field. Use a lot of specific jargon and funny ACroNymS. Reviewers love them!
- **Assume** that the reviewers will do the math (they have so much time to figure out everything!).
- Complain about your current supervisor / collaborators / institute. The reviewers will understand you.
- Tyops

# How you don't get a job:

For me participating **ESA** program is amazing challenge and a great pleasure. So many things to learn and discover and with you I know that will be wonderful. Therefore I'll be waiting and available for work and contribute for ESA any time. I hope to see you later.

My best regards,

**ENGLISH !**




# Do's

- **Read the job ad**
  - *You don't want to be the candidate they remember for sending 50 emails asking questions that are explained in the ad*
  - *Understand and follow the instructions (length, format, reference letters etc)*
  
- **Tailor your application for the job**
  - *Personalising your application for that job shows you are truly interested*



## Do's

- Focus! **Always get to the point.**   
Be clear, confident and **explicit.**
- **NEVER assume that reviewers will do the math (they won't)**
- **Demonstrate** that you have the skills / expertise
  - *provide examples*
  - *or, show how you will acquire them*

# What are **employers** looking for?

- **You can do the job and bring skills / expertise**
  - *Publications, talks, coding, instruments, data analysis techniques, ...*
- **You show initiative and motivation**
  - **Team player**, good communicator, reliable, open to new ideas, ...
  - Active, focused, **not giving up easily**, independent (fellowships!), easy to work with ...
- **A good investment**
  - *They want to use their funding in the best possible way*
  - *You are an “ambassador” to advertise the research group & institute*

# What are **employers** looking for?

**(+) Ability to plan and manage a project, successful PI-proposals ...**

**(+) Expert in the field, *clear vision about field* & (own) future ...**

**(+) Collaborations, access to data, able to attract funding, teaching, ...**

**(+) *Good soft skills!***

***Remember: It is hard to acquire funding for a position;  
employers want to make sure that the money is well invested***



# Generic positions (e.g., fellowships, staff, ESO, ...)

## Generic positions

**A selection committee reviews a large number of applications  
... at the same time,  
... within a few days.**

*Keep in mind:*

- *If the key information does not stand out, it might get overlooked (**and you're out!**)*
- *You will compete with many other exciting fields & outstanding projects*
- *Most reviewers will not be experts of your field*
- *Reviewers might be tired, as they have already read many applications*

***Make it easy for the reviewers ... please!***

# Committees look for strengths and weaknesses

- **Typical weaknesses in fellowship or staff applications:**
  - *research plan is written for experts*
  - *contribution to projects not clear (“we did”)*
  - *low publication rate, low number of (recent) lead author papers & talks*
  - *not clear why this institute*
  - *unrealistic timelines*
  - *overconfident that nothing can go wrong, no data in hand ...*

***Reviewers: Can the candidate survive & thrive in the job?***

# Committees look for strengths and weaknesses

- **Strengths:**

- clear **motivation** why this job and institute (ESO: e.g., why observatory duties?)
- clear long-term **vision** & growth (astronomy, own research, professional, ...)
- **independence** & network of collaborations
- clear **benefit** for the candidate and institute highlighted (“I bring ...”)
- **key messages** (“take-home” messages) for the committee
- realistic timeline, feasibility, **risk analysis** + Plan B

**Reviewers look for strengths and weaknesses!**



# The Application





# The Application

- **Cover Letter** = Motivation Letter
- **Curriculum Vitae (CV) and Publication List**
- **Statement of Research Interests** = Research Plan
- **Reference Letters** = Recommendation Letters
- **(Teaching Statement:** your teaching & mentoring experience & philosophy)
- **(Diversity Statement:** your personal experience with bias; lessons learnt; how to promote future equity, diversity & inclusion initiatives; psychological safety; tearing down barriers - making science accessible; outreach activities ...)

***Goal: make the committee curious so that they invite you for an interview!***



# The Cover Letter



- **The cover letter provides a first important impression about yourself: it's a teaser**
  - *It's your 2 min of glory - it will set the mood for the application*
  - *Think of a good opening – it can make a difference*
- **Address the recruiters personally**
  - *At least say something like ('Dear members of the XXX selection committee')*
  - *Specify which position you are applying for*

***You shall not underestimate the importance of a good cover letter!***

# The Cover Letter



- **Demonstrate how you meet the key selection criteria**
  - It's **NOT** a summary of your CV
  - Use it to **highlight the relevant skills & expertise of the job ad**
  - **Be proud**: highlight your achievements!
  
- **Convey your selling points: what makes you the best candidate? Why should they hire you?**
  - **What do you offer?**
  - Why that institute? How do you fit in there? Collaborators?
  - Show your vision, your **long-term plan** (= you are a good "investment")

# The Cover Letter



- **Write it even if not explicitly requested**
  - *Also use it for addressing issues there (e.g., not yet PhD; supervisor not writing letter; gaps in CV; how you will acquire skills you don't have)*
- **Keep it concise (~1 page of text)**

***You shall not underestimate the importance of a good cover letter!***

I am writing to apply for the ESO Fellowship based in Santiago, Chile. I am currently an NAOJ/ALMA fellow based at the Joint ALMA Observatory. Prior to this I attained my PhD at the University [REDACTED] writing and defending my thesis [REDACTED]



I am applying to this position as I wish to continue my career in astrophysics in a stimulating environment that combines both a vibrant scientific research community with opportunities to take part in cutting edge observations with world class facilities in the heart of observational astronomy in Chile. Through doing so I wish to develop my abilities both scientifically and personally, so that in the following stage of my career I will be equipped to prepare for staff [REDACTED] or more permanent positions at an observatory or university.

It is with great energy and excitement that I am writing to apply for the ESO Fellowship Programme. Having achieved my PhD, I have found my passion for astrophysics undimmed and wish to take it further with this fellowship representing the perfect opportunity. It was the successful call

As a passionate astronomer who is dedicated to learning more about the mysteries of the universe and applying these skills to the global community, I am looking forward to the next stage of my academic career. ESO's reputation and world-class facilities make it the idea



# The Curriculum Vitae



- **Make sure that the key info stands out (pages 1+2)**
  - ***Put the requested skills and expertise there***
  - *The CV must be adjusted / structured to fit with the job*
  
- **Find the right balance: don't pack your CV**
  - ***It's not a dumpster!***
  - ***Summarize*** where useful (provide metrics, lead author / co-I papers, h-index, ...)
  - ***Less is more:*** only put the relevant information for the job there





- Your contact information
- list your **education, job history, skills, further training, expertise**  
*- e.g., software, observing techniques, data analysis, instrumentation, ...*
- list (recently) **accepted proposals / grants as PI**  
*- show that you can bring data / money*
- list your (recent) **talks / contributions** at conferences, seminars,  
*... highlight the invited conference talks*
- **Mentorship + student supervision, teaching, outreach, ...**
- Contact details of referees

**DR FLORIAN RÖDGER**  
Astronomer

**Personal info & current job**

**Work history**

**Research area**

**Awards, grants, experience & skills**

**Education & work history**

**Overview of publications**

**Recent talks <5 yrs**

**Successful PI proposals, ...**

**Outreach**

**Mentoring activities, References**

**List of refereed papers ... (published, in press, submitted) and other publications**

31. K2-91 revealed a non-irradiated warm Jupiter, and a temperate giant planet on a 527 d orbit around a subgiant.  
Smith, Brown, CoRoT, Dai et al. (2022), MNRAS, 510, 5035

32. The CORNÉLIS search for exoplanets around M dwarfs: First radial-velocity radial-velocity measurements and orbital parameter updates of seven M-dwarf planetary systems.  
Ribes, Zechmeister, Caballero, Ribes et al. (2018), A&A, 612, A19

33. The CORNÉLIS search for exoplanets around M dwarfs: First radial-velocity radial-velocity measurements and orbital parameter updates of seven M-dwarf planetary systems.  
Ribes, Zechmeister, Caballero, Ribes et al. (2018), A&A, 612, A19

34. Three planets around HD 27981: A close-in pair with a 2:1 period ratio and an eccentric Jovian planet at 3.1 AU.  
Ribes, Zechmeister, Caballero, Ribes et al. (2018), A&A, 608, L5

35. ACCESST: An Optical Transmission Spectrum of GJ 1246 Reveals a Heterogeneous Stellar Photosphere.  
Espinoza, Apai, Lopez-Morales et al. (2017), AJ, 154, 151

36. The CORNÉLIS search for exoplanets around M dwarfs: First radial-velocity radial-velocity measurements and orbital parameter updates of seven M-dwarf planetary systems.  
Ribes, Zechmeister, Caballero, Ribes et al. (2018), A&A, 612, A19

37. The CORNÉLIS search for exoplanets around M dwarfs: First radial-velocity radial-velocity measurements and orbital parameter updates of seven M-dwarf planetary systems.  
Ribes, Zechmeister, Caballero, Ribes et al. (2018), A&A, 612, A19

38. The CORNÉLIS search for exoplanets around M dwarfs: First radial-velocity radial-velocity measurements and orbital parameter updates of seven M-dwarf planetary systems.  
Ribes, Zechmeister, Caballero, Ribes et al. (2018), A&A, 612, A19

39. The CORNÉLIS search for exoplanets around M dwarfs: First radial-velocity radial-velocity measurements and orbital parameter updates of seven M-dwarf planetary systems.  
Ribes, Zechmeister, Caballero, Ribes et al. (2018), A&A, 612, A19

40. CORNÉLIS: an overview six months after first light.  
Quirrenbach, Amado, Caballero, Mandt et al. (2016), SPIE, 9908, 990121

41. CORNÉLIS: an overview six months after first light.  
Quirrenbach, Amado, Caballero, Mandt et al. (2016), SPIE, 9908, 990121

42. CORNÉLIS: an overview six months after first light.  
Quirrenbach, Amado, Caballero, Mandt et al. (2016), SPIE, 9908, 990121

43. CORNÉLIS: an overview six months after first light.  
Quirrenbach, Amado, Caballero, Mandt et al. (2016), SPIE, 9908, 990121

44. CORNÉLIS: an overview six months after first light.  
Quirrenbach, Amado, Caballero, Mandt et al. (2016), SPIE, 9908, 990121

45. CORNÉLIS: an overview six months after first light.  
Quirrenbach, Amado, Caballero, Mandt et al. (2016), SPIE, 9908, 990121

46. CORNÉLIS: an overview six months after first light.  
Quirrenbach, Amado, Caballero, Mandt et al. (2016), SPIE, 9908, 990121

47. CORNÉLIS: an overview six months after first light.  
Quirrenbach, Amado, Caballero, Mandt et al. (2016), SPIE, 9908, 990121

48. CORNÉLIS: an overview six months after first light.  
Quirrenbach, Amado, Caballero, Mandt et al. (2016), SPIE, 9908, 990121

49. CORNÉLIS: an overview six months after first light.  
Quirrenbach, Amado, Caballero, Mandt et al. (2016), SPIE, 9908, 990121

50. CORNÉLIS: an overview six months after first light.  
Quirrenbach, Amado, Caballero, Mandt et al. (2016), SPIE, 9908, 990121



# Statement of Research Interests



## Previous / current projects (~1 page)

- *Context*
- *What were the questions you (have) tried to answer (or answered)?*
- *What have you learnt? What were the challenges that you have overcome?*
- *Highlight aspects that are directly relevant to the position you're applying for*

## Future / Proposed project

***Tell it like a story!***



## Future / Proposed research (1)

- Context!**
- **Basic introduction into the field (if not done before)**
  - **Motivation** : What is the main question you want to answer with your project?
  - **Relevance**: Why is it relevant? Why should it be funded? (exoplanets vs. AGNs 😊 )
  - **The Project**:
    - Focus on the future, what do you want to do within the next years, and how.
    - Show that you have ideas of your own (even for a project-specific postdoc).
    - Explain how will your project benefit from being at that institute, and what you will bring to the institute
  - ...



## Future / Proposed research (2)

- *Basic introduction to the field (if not done before)*
- *Motivation*
- *Relevance*
- *The Project*
- **Data:** *What data is needed and what do you have already in hand?*
- **Feasibility, risk assessment, timeline:** *What could go wrong? Weaknesses? Plan B?*
- **Impact:** *How will your project advance your field of research? What will you learn?*
- **Vision:** *Where will you & your field of research be at the end of your project, in 5 years, ...?*



- **Basic introduction into your field and topic**

- *What is the main question you want to answer? Why? How?*
- *For generic fellowships, find the right balance for non-experts and experts:  
**the more reviewers you convince, the better!***

- **How does your research relate to the bigger picture?**

- *What work has previously been done?*
- ***Highlight your contribution: “I achieved ...”** (especially in collaborations)*
- ***Demonstrate** your ability to lead and conclude a project. You can do the job!*
- *How will your project advance the field (now - after)? **Long-term vision!***

- **Make it easy & enjoyable to read**

- *Don't pack it (respect the page limit, font size at least 11 pt ...)*
- **Avoid walls of text, long paragraphs, long sentences.** *They look intimidating and tiring.*
- *Don't get lost with tiny details. Instead, convey the bigger picture!*
- *Highlight **key messages** for the committee!*

- **Mention (potential) collaborators at the institute**

- **Make sure text / figures can be understood by non-experts**

- *Explain them*



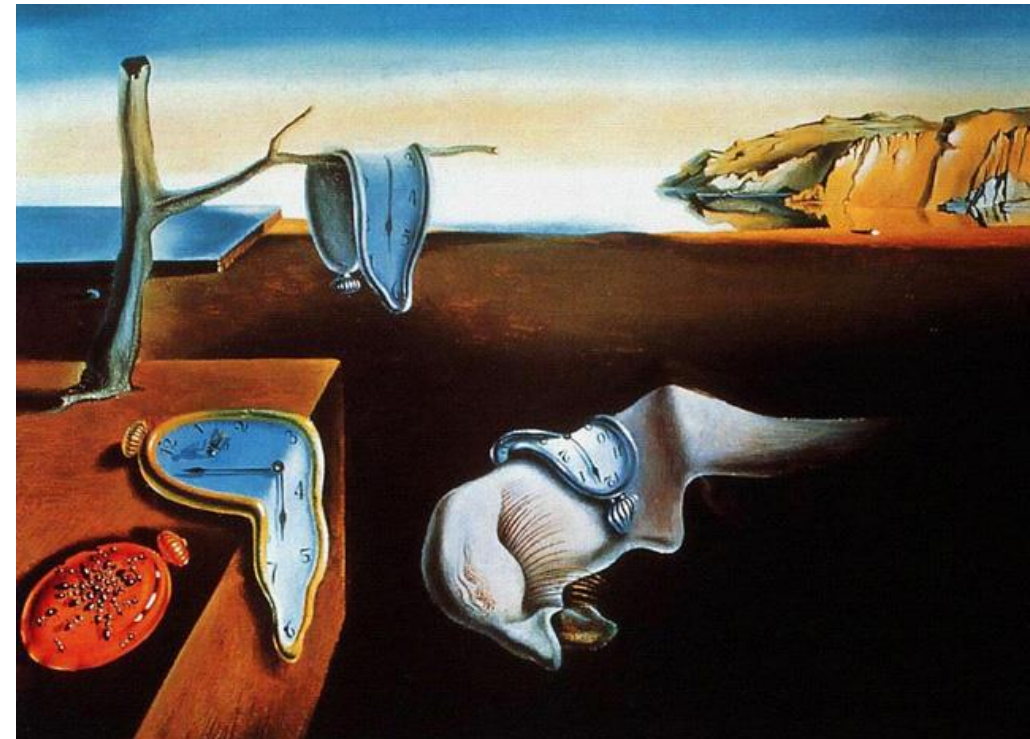


- **Time management & feasibility**

- *Present a "realistic" timeline*
- *Show that you have the means to do what you want (**data, software**)*
- ***Back-up plan!!!*** *Be aware of the **weaknesses** of your project.*  
*(What happens if your observing proposals gets rejected or you won't get data?)*

- **Proof-reading!**

- *Ask colleagues & collaborator for feedback.*





## RESEARCH STATEMENT

I completed my bachelor's degree in Physics and Astronomy but after my graduation, I was engaged in teaching basic Physics at a high school where I got keen interest of imparting knowledge to the younger ones. This actually necessitated my decision to pursue a career in teaching and research in Physics. As a result, I decided to upgrade completely my career track by starting a postgraduate programme in Physics. I chose the field of Astronomy because of my personal love for sky gazing, watching mainly the milk way and Triangulum galaxies.

**RESEARCH EXPERIENCE:** I have worked on several research projects while enrolling in postgraduate programs. My master's thesis was on [Pulsar Spin-Down Parameters](#) under the supervision of [Prof. Dr. M. S. R. Rao](#). It is based on statistical analysis of a large sample of Jodrell Bank Observatory (JBO) radio pulsars with improved and published data on stability parameters ( $\dot{P}$ ) and other quantities that are used to parameterize pulse rotational fluctuations on observation timescales [timing noise activity parameter  $A$ , timing noise statistic ( $\sigma_{\dot{P}}$ ) and pulsar clock stability parameter  $\sigma_2$  (T)] which were compiled for an in-depth characterization of the spin-down evolution of rotation-powered pulsars. The existence of any relationship goes a long way in helping to probe the properties and dynamics of a neutron star. The results of our analysis reveal that radio pulsar spin-down parameters are reasonably coupled to timing noise activity. A simple regression analysis of our data show that timing irregularities in pulsar is more than 75% correlated with the magnitude of pulsar spin-down variables. The implications of the result of the improved measurements of the key parameters characterizing the spin-down of pulsars on long timescales are discussed in the thesis.

However, our later research articles centred on pulsar spin-down evolution as well as pulsar glitch mechanisms. We showed from a detailed analysis that the angular momentum transfer model could readily account for the current range of pulsar glitch sizes. We also discussed the present challenges faced by the angular momentum transfer mechanism, and indicated that it is no longer enough to explain glitches and the present equation of state is not enough to model a glitching pulsar. These projects exposed me to the use of python, matlab and statistics in interpretation and modelling of astrophysical data.

In my Ph.D dissertation, we looked at the unification scheme of active galactic nuclei using a sample of radio galaxies and the blazar subclasses of the spectrum radio quasars and BL Lacertae objects by

1

investigating the consequences of relativistic beaming on the unified scheme of blazar populations and radio galaxies. This work was supervised by [Prof. Dr. M. S. R. Rao](#). Our results show remarkable continuity in the distributions of source luminosities (radio core and extended luminosities,  $L_C$  and  $L_E$  respectively as well as  $\gamma$ -ray luminosity  $L_\gamma$ ) from radio galaxies at low luminosities to FSRQs at high luminosities through BL subclasses as expected in the blazar unification scheme in a sense suggesting that the sequence of BL Lacs, FSRQs and radio galaxies represents progressively misaligned populations of AGNs. Distribution of radio core-dominance is consistent with average projection angle of 13.5, 14.8, 16.8, 20.4 and 28.2 for ISPs, LSPs, FSRQs, HSPs, and radio galaxies, respectively. Linear regression analyses of our data yield significant anti-correlation ( $r > 0.60$ ) between core-dominance parameter ( $C$ ) and  $L_E$  in each individual subsample; the correlation is significant only when individual subsamples are considered. There is a systematic sequence of the distribution of the different subclasses on the  $C - L_E$  plane. Nevertheless, little or no correlation between  $C$  and  $L_C$  or between  $C$  and  $L_\gamma$  ( $r < 0.50$ ) was observed. There is a clear dichotomy between high synchrotron-peaking BL Lacs and other BL Lac subclasses. The results are consistent with a unified view for blazars and can be understood in terms of relativistic beaming persisting at largest scales.

Similarly, since our understanding of the unification of jetted AGNs has advanced greatly as the size of extragalactic sources increased, we also compiled a sample of AGN subclasses to statistically test the relationship between Seyfert galaxies and the blazar samples of FSRQs and BL Lacs by computing the synchrotron (SS), Compton (CS) and inverse Compton (IC) continuous spectra from the low energy components of radio to X-ray, radio to  $\gamma$ -ray and the high energy component of X-ray to  $\gamma$ -ray bands, respectively. Results show from the distributions of the continuous spectra that Seyfert galaxies form the tail of the distributions, suggestive of similar underlying history and evolution. A two-sample Kolmogorov-Smirnov test (K-S test) of the continuous spectra showed that Seyfert galaxies differ from BL Lacs and FSRQs in the low energy components of the spectra, while there is no clear difference between them in the high energy component, which implies that high energy emissions in Seyfert galaxies, BL Lacs and FSRQs may be as a result of the same emission mechanism. There is a regular sequence of the distributions on  $SS - CS$  and  $IS - CS$  planes in each individual subsample. Linear regression analyses of our sample yield significant positive correlations ( $r \sim 0.60$ ) between  $SS - CS$  and  $IS - CS$  data. This opturs into an anti correlation ( $r > -0.60$ ) in  $IS - SS$  data. These results are not only consistent with unified scheme for blazars but also show that Seyfert galaxies can be unified with the classical radio-loud AGNs counterparts.

2

2

Meanwhile, I have supervised several undergraduate research projects in Physics and Astronomy and have also contributed significantly in the discussion of M.Sc seminars of our postgraduate students in our research group. In addition, I participated in the postgraduate stream of West African International Summer School for Young Astronomers (WAISYYA) 2019, where I learned data reduction and model (Frequentist and Bayesian) optimisation using python programming among other skills. In the course of these researches/workshops, I have also learnt data reduction skills of telescopic and interferometric data using common astronomy software applications (CASA) and python programming. Such good analytical and computational skills coupled with efficient team working attitude, research discipline and problem management skills is indispensable in learning process during the programme.

**FURTHER RESEARCH INTERESTS:** Galaxies are the fundamental building blocks of the universe and massive galaxies are known to be active due to intense accretion of matter onto a supermassive black hole at the centre of the galaxy. It is widely believed that the energetic output of radio-loud active galactic nuclei (AGN), which launch powerful relativistic jets of material, plays a significant role in controlling star formation in their surrounding galaxies. This led me to undertake a project that is centered on possible ways of addressing some of the existing gaps in our knowledge of the physical processes that drive radio-loud AGN activity and how these physical processes evolve across cosmic time. This can be done through the vast samples of radio loud AGN being generated in various surveys at radio, optical, X-ray and  $\gamma$  ray frequencies. The research focused on developing some theoretical framework for modelling and statistical interpretation of the observed data for both high- and low-redshift AGN. Specifically, the project employed multi-wavelength data that are readily available in public archives to investigate the accretion-emission properties of AGN over a wide range of redshift. Special attention was paid to similarities and/or systematic differences in the data, which was interpreted in the context of the evolutionary scenario.

My ultimate goal is to work with research based groups in space science and extragalactic radio astronomy in order to pursue programs of scientific research with a view of consolidating existing knowledge or uncovering fundamental knowledge concerning the astronomy and astrophysics and improve human resource capacity building through training. I believe that the position I applied for will enable me to utilize my full potentials and produce new and original research findings for application of national interest. I perceive this opportunity as extraordinary as there will be interactions with scholars from diverse professional and cultural backgrounds. This type of networking will provide means for greater international understanding, solidarity and collaboration between scientists worldwide.

3

3

## Research Statement (PDF 2021, UDP)

### Summary of past research activities

During galaxy mergers, the supermassive black holes (SMBHs) of the individual galaxies sink to the centre of the merger remnant (Sagehan, Blanford & Rees 1990) and form a SMBH pair. Numerical simulations show that merger induces strong gas inflows. This can give rise to nuclear outbursts (Mayer et al., 2007) and the mass accretion onto the SMBHs which can result in dual active galactic nuclei (DAGN). A large sample of DAGN observed over a range of separations can help us explore the following issues: (i) How do galaxies evolve in the presence of DAGN? (ii) How do the SMBHs grow during mergers? (iii) How does the feedback associated with DAGN affect galaxy disks? However, the detection rate of DAGN is very small (De Rosa et al., 2019). This needs high-resolution radio, optical/infrared, or X-ray observations. Double-peaked emission line AGN (DDAGN) are one of the candidates DAGN.

My Ph.D. thesis work was mainly focused on two aspects: (i) to detect DAGN (separation  $< 10$  kpc) in the center of galaxies and (ii) to understand the evolution of the nuclear region in the presence of dual nuclei. Both these objectives can be achieved primarily by using multi-frequency high-resolution imaging and spectroscopy.

We obtained high-resolution multi-observations of 20 double-peaked emission line AGN (DDAGN) using the Karl G. Jansky Very Large Array (VLA), to achieve the first objective. We found that one of our sample galaxies (2MASX1203) shows an S-shaped radio core-jet morphology with highly asymmetric radio jet (Fig. 1A). We presented a simple model of precessing jets in 2MASX1203 (Fig. 1B) and found that the precession timescale is around  $10^5$  yr; this matches the source lifetime estimate via spectral ageing. The calculated, expected supermassive black hole (SMBH) separation corresponding to this time-scale is 0.02 pc. We conclude that the S-shaped radio jet are due to jet precession caused either by a binary AGN with a separation of 0.02 pc; a single SMBH with a tilted accretion disc or a dual AGN system where a close pair of the secondary SMBH in the past has given rise to jet precession (Rahman et al. 2017).

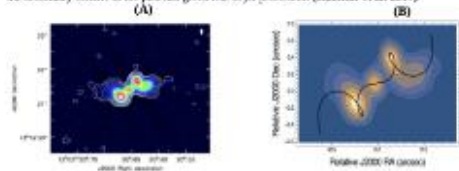


Fig. 1: (A) The uniform weighted 8.7 GHz EVLA image of 2MASX1203. The beam size is  $0.13$  arcsec  $\times$   $0.17$  arcsec. The contour levels correspond to 0.60, 1.25, 2.5, 5, 10, 20, 40, 60, 80 % of peak flux density value at 8.66 MHz. (B) The uniform weighted 8.7 GHz radio image of 2MASX1203 in colour, superimposed by the precessing jet model of Hjellming & Helou (1991) in black.

Dual radio structure at separation of  $\sim 10$  kpc are observed in three of our sample galaxies (Rahman et al. 2018, 2019). Using the spectral index maps and optical spectra of the sources, we have confirmed that one of them is a DAGN (2A), while the other two can be dual AGN or AGN+star-forming nuclei pairs. Of the remaining sources, one has a clear core-jet structure and another source could be a core-jet structure or a DAGN. The remaining 13 sources are single cores while one source is not detected at any frequency. We concluded that DDAGN identified in low-resolution SDSS spectra are not good tracers of dual/primary AGN. On the other hand, closely interacting galaxies or merger remnants are good candidates for detecting dual/primary AGN. We have explored the other parameters like  $M_{BH}$ , vs. [OIII] luminosity  $L_{[OIII]}$  etc. and tried to find the correlation in these galaxies (Fig. 2B).

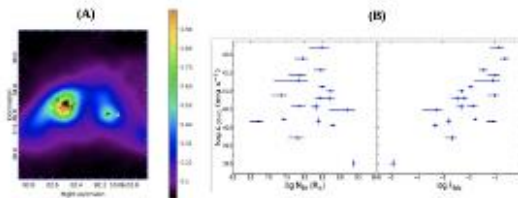


Fig. 2: (A) The 8.5 GHz contours superimposed on the SDSS g-band image of the galaxy SDSS J13020-11-0711004. This is a confirmed DAGN from our sample. (B) The left panel shows  $M_{BH}$  vs. [OIII] luminosity ( $L_{[OIII]}$ ). There is no correlation between the plotted quantities. Top right panel shows the Eddington ratio  $\lambda_{Edd}$  vs.  $L_{[OIII]}$ . Stars have been plotted for all the quantities.

In the second project, we began ultra-violet (UV) imaging of dual nuclei using the ultra-violet imaging telescope (UVIT) on ASTROSAT satellite (10 galaxies). The UV study can help us to understand the star-formation and AGN feedback associated with the dual nuclei/AGN (Rahman et al. 2020). We did a multi-wavelength study of one (Mrk 212) of these UV sample galaxies (Fig. 3A, 3B). Our new 15 GHz VLA, uGMRT-VLA spectral index map and optical spectra confirmed the low-luminosity DAGN (Sey 51 and S2) in Mrk 212. The deep FUV and NUV observations with the UVIT reveal SF knots around one of the nuclei (S2) as well as kpc-scale tidal tails. The SF knots around S2 coincide with the extended radio structure detected at 8.5 GHz. The radio spectral indices are consistent with SF. Any possible association with the AGN in S2 is unclear at this stage. We need smaller higher-resolution radio and molecular gas observations to investigate the possibility of positive AGN feedback (Rahman et al. 2021).

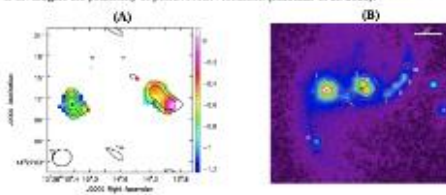


Fig. 3: (A) The spectral index image from the VLA 8.5 and uGMRT 1.4 GHz images. The 8.5 GHz contours are overlaid. The black crosses are the optical centre. (B) The NUV image of Mrk 212 from UVIT observations. This deep UV image has resolved star-forming knots, S2 has two such bright UV knots (knots 3 and 4) which coincide with two tidal structures detected at the 8.5 GHz radio image. The circles are regions selected to calculate SFRs. The black cross symbols show the optical centres of the galaxies. UV bright knots (3, 4) are 1 arcsec away from S2 nuclei. These can be due to merger-induced gas or AGN feedback.

I am carrying out following research during my present PDF position at NCRA-TIFR:  
(i) **Origin of kpc-scale radio emission in Seyfert galaxies:** We are studying a sample of 26 well-observed Seyfert galaxies which show signatures of kiloparsec scale radio emission (KSRs) in previous studies (Gallimore et al. 2016). As the origin of KSRs is unclear, especially for sources with weak AGN, we are trying to explore radio emission from AGN activity and nuclear shells in these sources. We have observed these with the GMRT (uGMRT) at 325 and 610 MHz (last cycle). These data have been reduced and all the

images are obtained. The analysis is going on. I expect to submit this work in next four months (Rahman et al. 2021), in prep.

(ii) **Star-formation in dual nuclei galaxies:** As mentioned before, we have carried out a pilot study of a sample of  $\sim 10$  dual nuclei galaxies with AstroSat's Ultraviolet Imaging Telescope (UVIT) and explored one of the sample galaxies Mrk 212 with deep UVIT and high-resolution VLA observations (Rahman et al. 2021). The initial UVIT observations were done with short exposure time ( $\sim 5$  hrs). These initial observations have revealed the signatures of positive AGN feedback in other two galaxies (Rahman et al. 2021). Deeper UVIT observations (30 hrs) have recently been obtained for these two sources. We have obtained the star-formation changes in the UVIT images. The SFRs are calculated from multiple indicators in UV, radio, IR band. The major reason of these galaxies is unclear and we are planning to observe in SFR-IR plane. This work is in final stage and I expect to submit in next month (Rahman et al. 2021B, in prep).  
(iii) **Theoretical Modelling and Emission Signatures of S-shaped Radio Galaxies:** (Rahman et al. 2021).  
(iv) **Hubbert:** In this collaborative work, we aimed to model the observed S-shape of 2MASX J12052061-131551 due to a precessing jet (Rahman et al. 2017). In this regard, a high-resolution SD-MHD simulation of a precessing jet in an ambient was performed. The emitting properties obtained between our synthetic maps and the observed maps of the galaxy suggest the precessing jet model is forming S-shaped radio galaxies. This work will be submitted in next two weeks (Rahman et al. 2021), in prep.

### Outline of research plan at UDP:

(i) **Understanding the environment of Hot, dust-obscured galaxies (with Professor Roberto J. Asensio):** Correlations spanning several orders of magnitude exist between the mass of the central SMBH and the properties of the host galaxy e.g. the SMBH mass and the velocity dispersion of bulge  $M_{BH} \sim \sigma$ . These relations can be explained by a connection between the SMBH growth and the available gas, suggesting that the fueling of the host gas reservoir on the SMBH is regulated by AGN activity in the form of energetic radiation, outflows, and jets. Hot, dust-obscured galaxies (Hot DOGs) are hyper-luminous obscured quasars with bolometric luminosities  $L_{bol} \geq 10^{46}$  W. Many Hot DOGs are found in over-dense regions suggesting the merger scenario. Diaz-Santos et al. (2018) have reported multiple merger events in the most luminous Hot DOG using ALMA spectroscopy. Asad et al. (2020) explored three Blue-Excess Hot DOGs (BEHDs) and found out that UV emission is most likely the dustless scattered light originated from highly obscured, hyper-luminous AGN and the presence of strong star-formation or a second AGN is elusive. Here, using my past experience, I would like to investigate these scenarios like the presence of dual AGN using high-resolution radio observations. I would also like to carry out ALMA observations of the DOGs to understand the environment.

(ii) **AGN feedback in Hot, dust-obscured galaxies (with Professor Roberto J. Asensio):** Hot DOGs seem to have Eddington ratios close to unity or above (Toll et al. 2011) and it is expected that when SMBH accretes close to the Eddington limit, it ejects jet accompanied with relativistic winds. Also, the dense environment of Hot DOGs induces complex, turbulent phase of galaxy evolution (Diaz-Santos et al. 2021) with the presence of recurrent outbursts which can launch new radio jet. Multiple jet components can also be generated by Mpc timescale (Gallimore et al. 2016). The VLBI studies reveal radio emission in some of these sources (Frey, S et al. 2015, Fan, L et al. 2020). However, real multi-resolution can be investigated by telescopes like VLA or uGMRT which is well an unexplored area. I would like to run a high-resolution radio study along with multi-wavelength observations to explore the AGN feedback and AGN recurrent activities in Hot DOGs.

(iii) **EVL A observations of DAGN candidate (independent research):** I would also like to continue my of my ongoing research on "Search for dual AGN (DAGN) candidates". During my Ph.D. I compiled a sample of DDAGN and observed them using EVLA to detect DAGN (Rahman et al. 2017, 2018, 2019). Recently, I have started collecting a new sample of candidate DAGN using low-resolution optical and radio images in close interacting galaxies. A sample of five galaxies are observed using EVLA in the last cycle which I expect to work at UDP. I will also be obtaining uGMRT data for peculiar radio galaxies which are DAGN candidates in the upcoming cycle.

References: (i) Sagehan M. C., et al. 1990, Nature, 347, 107 (ii) Mayer L. et al., 2007, Science, 315, 1874 (iii) De Rosa, et al., April, 2019, 88, 1053 (iv) Rahman R. et al., 2017, MNRAS, 465, 4772 (v) Rahman, R. et al. 2019, MNRAS, 484, 4733 (vi) Rahman, R. et al. 2018, MNRAS, 479, 1 (vii) Rahman, R., Das, M. Khoury, P. et al. 2015, Fan, L. et al. 2020, ApJ, arXiv:2011.12063v1 (viii) Asad, R. I., et al. 2015, ApJ, 804, 27, (ix) Diaz-Santos, et al. 2018, Science, 362, 1034, (x) Frey, S., et al. 2015, MNRAS, 455, 2668 (xi) Toll, C.-W., Diemand, et al. 2011, ApJ, 738, 15 (xii) Diaz-Santos et al. 2021, MAA, arXiv:2104.06495 (xiii) Gallimore, J. P. 2016, ApJ, 817, 546 (xiv) Rahman et al. 2020, 2102arXiv:200102222R

### Research Statement

#### Past Research: using the star-formation histories of bulges and discs to understand the formation of S0 galaxies

While both ellipticals and S0s are thought to be endpoints in the evolution of spirals, their different morphologies suggest different transformation scenarios once the star formation (SF) ceases. With their bulge and disc structure, S0s more closely resemble spirals than ellipticals, suggesting that gentler processes which haven't disrupted the disc structure have driven their transformation. Many mechanisms for this transformation focus on the gas being stripped out, such as ram-pressure stripping (Sains & Galt 1972) and starvation (Jewson et al. 1995), or wind up, through minor-mergers (Moore & Heisler 1994) and harassment (Moore et al. 1996), leading to the truncation of the SF. Each of these processes would leave a different signature on the stellar populations within both the bulge and disc of the final S0. My research has focused on developing techniques to spectroscopically resolve the stellar populations of these components to look for such signatures and understand the transformation of spirals into S0s.

#### The transformation of spirals into S0s

During my career, I have developed several techniques to model and extract the spectra of the bulges and discs of S0s using targeted spectra in order to study their star-formation histories (SFH) with minimal contamination. These techniques use both the differences in kinematics between components (Johnston et al. 2013; Labor et al. 2017) and variations in the major-axis light profile as a function of wavelength (Johnston et al. 2012, 2014). I applied these techniques to S0s in the Fornax and Virgo Clusters, and studied the stellar populations of the bulges and discs from these uncontaminated spectra. I found that the bulges of all these galaxies contain younger and more metal-rich stellar populations than their surrounding discs. This result was surprising since the progenitor spirals typically contain old bulges and only disk SF in their discs. Consequently, it appears that during the transformation, a final episode of SF occurs in the bulge region of each galaxy.

I followed up on this result by investigating the origin of the gas that fueled the SF in the bulges using the [alpha]Fe ratios, elements originate in SNI while Fe mainly comes from SNIa, which start later than SNI after the onset of SF. Therefore, higher [alpha]Fe ratios reflect more  $\alpha$ -enriched gas and earlier SF timescales. I found that in each galaxy the [alpha]Fe ratios in the bulge and disc were consistent, indicating that the gas that fueled this final episode of SF within the bulge region was likely enriched by SF throughout the disc.

From these results, I concluded that the process that truncates the SF in the disc leaves behind small amounts of enriched gas. Over time, the gas is channelled into the centre of the galaxy, where it triggers a final starburst in the bulge region. However, with targeted spectra alone, I lacked the spatial information to determine whether the starburst occurred in the innermost region of the disc or was spread throughout the entire bulge. To answer this question, we need to model the 2-dimensional structure of each component in the galaxy as a function of wavelength to extract their spectra and physical properties. This information is now available as IFU datacubes.

**BUDDI (Bulge-Disc Decomposition of IFU data)**  
With the recent commissioning of wide-field, high spatial resolution IFU spectrographs such as MUSE, one can now study the photometric and spectroscopic information across a galaxy simultaneously. While at ESO I developed BUDDI, a code which applies wavelength-dependent 2-Dimensional light profile fitting to the entire datacube to cleanly model and extract the spectra and physical properties of the bulge and disc of that galaxy (see Figure 1, Johnston et al. 2017).

As a pilot study, I applied BUDDI to 2 S0 galaxies from the MUSEA survey commissioning data set. Both galaxies were found to be very different, with one containing young stellar populations in the bulge and disc while the other contained only old stellar populations throughout. In the younger galaxy, I again found that the bulge of the younger galaxy contained younger stellar populations than the disc and that in both galaxies, their bulges and discs showed comparable [alpha]Fe ratios. It is interesting to see the same trend appear in these two very different S0 galaxies, and these results suggest that formation of the bulges and discs in S0s are tightly coupled. I am currently working to continue this analysis on a larger sample of S0s from different environments, for which we obtained MUSE data in 2018 (D'Onofrio et al. 2019, Johnston et al. in prep).

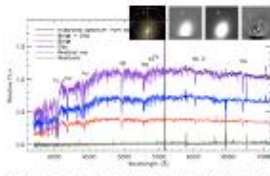


Figure 1. The extracted one-dimensional bulge and disc spectra for a MUSEA S0 in red and blue respectively. The black line shows the original integrated spectrum and the purple line is the combined bulge+disc spectrum. The inset shows the SF history of the galaxy, the black/DA white-light image, the best-fit model and the residual image.

1

### Research Statement

#### Proposed Research: the formation of dwarf galaxies and their role in the mass assembly of massive galaxies

Dwarf galaxies, are the smallest and most numerous galaxies in the Universe, and play an important role in the mass assembly of larger galaxies through successive mergers. Nuclear star clusters (NSCs) are a common characteristic of dwarf galaxies, and occur more frequently in higher-mass dwarfs, as shown in Fig. 2. I will study these NSCs with regards to the two main scenarios proposed to explain their formation: the in-situ and migration scenarios (Mészáros et al. 2004; Tremblin et al. 1975). The in-situ scenario describes gas falling into the core of the galaxy, subsequently triggering SF and forming a NSC there. The migration scenario on the other hand proposes that a globular cluster (GC) forms in the outskirts of the galaxy and migrates to the core, possibly followed by dry mergers with other infalling GCs. These scenarios would leave distinct signatures in the SFHs of the NSCs in terms of the timescales and number of episodes of star formation, which I will identify in their stellar populations.

#### The formation of dwarf galaxy nuclei

As part of the Next Generation Fornax Survey (NGFS), I am leading the spectroscopic follow-up of the nucleated dwarf galaxies with MUSE. While NSCs appear more frequently in higher mass dwarfs, their masses increase at a slower rate than the masses of the host galaxies, and as a result their mass fractions decrease in higher mass dwarfs. For example, the NSC in dwarf galaxies of mass  $10^7$  and  $10^8 M_{\odot}$  would have a typical mass fraction of 0.04 and 0.003 respectively (D'Onofrio et al. 2018). As a result, NSCs are faint, and their spectra are dominated by the light of the host galaxy, making it difficult to disentangle their stellar populations.

My unique approach to this issue is to use BUDDI to model the NSC and its host galaxy to isolate their spectra and study their stellar populations independently. This work has already begun using a sample of 71 Fornax dwarfs, and I propose to observe a further 6 galaxies has been accepted for the current semester. The first aim of this study is to measure the SFHs, enhancements and physical properties of the NSCs to determine which process most likely created them.

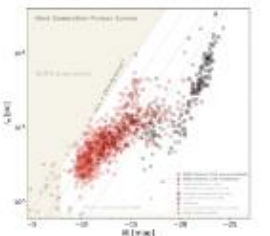


Figure 2. The mass ratio for NSCs to their host galaxies. The red dots represent the NGC nuclei detected with FOR2, with the black dots reflecting MUSEA. The grey and red dots show the MUSEA and Virgo and Fornax respectively.

2

### Research Statement

(MGs). However, if the transformation was this simple, one would expect a continuous sequence with galaxy mass on the mass-size relation in Fig. 2, whereas in reality the dwarf and MG sequences are connected by a tail transition region.

Figure 3 shows the white-light images created from the original datacube of a Fornax dwarf and the best fit model, with the models for each component in the right column. I have found that many of the more massive dwarf galaxies in the transition region, such as this example, required a 3-component model to obtain the best fit to the host galaxy. Similar 3-component models have been used in the literature to model ETGs (e.g. Huang et al. 2019), which may reflect that the structure of

the galaxies becomes more complex as they pass through the transition region. Another finding of D'Onofrio et al. (2018) is that as the galaxy mass increases from the dwarf to MG sequence, the mass fraction of the NSC increases, steadily with the galaxy mass for ETGs, while Late Type Galaxies (LTGs) show a continuation of the dwarf-mass sequence (increasing mass fraction with host galaxy mass). Interestingly, preliminary results from Nedkova et al. (in prep) have shown that the bulges in MGs also overlap with the transition region, further hinting that galaxy structure becomes more complex during the transition.

I will investigate this transformation from dwarf to MG by looking in particular at the structural properties and stellar populations of the different components in galaxies throughout the mass-size relation. In particular, I will study the emergence of galaxy bulges and discs in terms of the different structures seen in dwarfs and massive galaxies. Data for this project will come from various sources: in addition to the MUSE data of Fornax dwarfs described above, I also have LS spectra of Fornax and Virgo S0s from my PhD work. Furthermore, I will work with the Fornax3D team to share their MUSE observations and analysis of galaxies of all morphologies within Fornax.

#### The link between dwarf galaxies and UCDs

It has been proposed that stripped NSCs (UCDs) are the stripped NSCs from dwarf galaxies (Beski et al. 2001). Thanks to the power of BUDDI at extracting the uncontaminated spectra of NSCs, I will investigate this link by comparing the stellar populations of NSCs with those of UCDs. MUSE observations of several Fornax UCDs are already publicly available in the ESO archive, and I will use this data alongside the NSC spectra I have derived with BUDDI as a pilot study into these two object classes. This study will be the first to directly compare the uncontaminated properties of NSCs with UCDs, and will not only confirm whether UCDs are stripped NSCs, but will also shed light on the processes that stripped the rest of the galaxy and what, if any, impact this process had on the NSC itself.

Using high-quality data and my new and highly diagnostic techniques, the combination of my past and proposed research will give a unique and comprehensive overview of the formation and evolution of galaxies over a wide range in mass and morphology. The proposed research plan has a wide scope, with plenty of opportunities for short and long term student projects that would be suitable for Master and PhD theses.

References: Beski et al. 2001, ApJ, 552, 460; D'Onofrio et al. submitted to MNRAS; Sains & Galt, 1972, MNRAS, 171, 119; Sains et al. 2011, MNRAS, 411, 1400; Tinsley & Caswell, 1993, ApJ, 397, 60; Moore & Heisler 1994, ApJ, 402, L12; Mészáros, 2004, ApJ, 612, 100; Moore et al. 1996, MNRAS, 273, 115; D'Onofrio et al. 2018, ApJ, 861, 10; Sains et al. 2011, MNRAS, 406, 2024; Tremblin, D'Onofrio & Saha 2015, A&A, 569, 47.

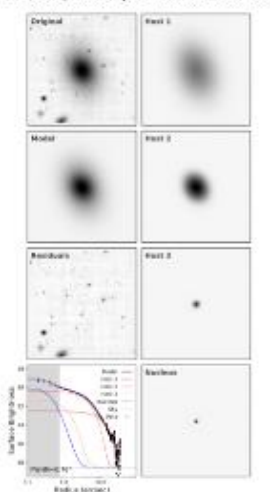


Figure 3. Left column, from top: the white-light image of a Fornax dwarf, the best fit model from BUDDI, and the residual image. Left column, from top: the model of each component that was included in the best fit model, including three components representing the light from the host galaxy and the NSC. The bottom-left plot shows the 1-dimensional light profile of the galaxy along the major-axis with the light profile of each component and the best fit (overplotted). The dashed line reflects the PSF of the MUSE, and the dashed line reflects the ray to diagonal.

3



# Reference Letters



- **Reference letters are very, very important!**
  - They provide additional information about you: **how it is to work with you**
  
- **Ask referees who know you well / have worked with you**
  - Everyone can write a letter. But you want a **supportive** one:  
**"I will need a strong / supportive letter, would you agree to ...?"**
  - Tell them what the job is about, what to highlight, send them the job ad
  - Ask them for their honest feedback if they really can support you for that job



- **Letters need to be tailored for each position**
  - *Ask early: writing an excellent letter is a lot of work*
  
- **Make sure that the letters are submitted on time**
  - *Tell the referees to whom to address it, where to send it, when to send it*
  - *Send a reminder one week before the deadline!*

***(Dear referees, don't blabber endlessly about the applicant's research and papers. Tell us about them, how it is to work with them!)***



- **Diversify your referees**
  - *Cultural differences (US vs. Europe)*
  - *You can ask each referee to highlight a specific aspect in their letter*
  - *If you are never invited for an interview, the reason could be a referee writing a bad letter*
  
- **Send the job ad & your application to the referee**  
**+ ask them for feedback**
  - *If the feedback is useless, consider choosing another referee 😊*

***(Dear referees, don't blabber endlessly about the applicant's research and papers.  
Tell us about them, how it is to work with them!)***





**Can you read your application within  
a few minutes?**

**After a tiring day?**

**Good luck with your applications!**

# The Job Application – Take-Home Messages



- Tailor the application to the job
- What can you bring (expertise, skills, ...) and learn? Why should you be hired?
- Demonstrate how you meet the key selection criteria
- Be clear, be explicit, come to the point.
- Make it easy for the reviewers (they may not be experts)
- Know the strengths & weaknesses of your CV, project
- Selling points: Have clear take-home messages for the reviewers
- Give sufficient time to the referees writing good reference letters