

TIMESTEP

Graduate School Application Overview- Astronomy and Physics Majors

Dr. Gurtina Besla, Professor of Astronomy
Dr. Erich Varnes, Professor of Physics
Wednesday, October 15th, 5-6:30 pm
Steward, N305



Please complete this survey first !

UROC McNair Program

Priority deadline is
November 16



Questions? Let's chat!
crosariokelly@arizona.edu

Undergraduate
Timeline
Two years

Additional Perks

Prestigious
national program

10 units of credit

\$5,000 first
summer stipend

Fee waivers for
grad school apps

Presentation at a
national
conference



Sophomore Year

Envision: Application,
Decision, Research Design
Course (Spring Semester)



First Summer

UROC Research Experience
at U of A



Junior Year

Practice: Dive deep into
graduate school research
and preparation.



Second Summer

Research Experience
Elsewhere



Senior Year

Launch: Graduate
Preparation Course,
application, acceptances

AAS CSMA Launches Micro-Grants Program



Neelab Yousafzai

American Astronomical Society (AAS)

More information
& application:



Photo credit: American Institute of Physics

Administrator: Dr. Carlos J. Vargas
CSMAgrant@aas.org

The **AAS Committee on the Status of Minorities in Astronomy (CSMA)** was awarded a \$15,000 **AIP Diversity Action Fund Award** to establish the CSMA Micro-Grants Program. This program sponsors Black, Indigenous, People of Color (BIPOC), and other students who are suffering from the effects of financial scarcity. Yearly through 2023, the program will offer 10 one-time grants of at least \$500 each to support BIPOC undergraduates to pay graduate school application fees, GRE testing fees, virtual conference registrations, or to purchase textbooks and research supplies. The 2023 Micro-Grants Program applications are open as of 28 August and will close on 13 October (11:59 pm ET).

GRADUATE STUDENT PANEL

TIMESTEP

WEDNESDAY, SEPT 24 • 5:00 – 6:30 PM
<https://arizona.zoom.us/j/82615759625>



Moderator:
Christa DeCoursey
UA Astrophysics

ARE YOU INTERESTED IN GRADUATE SCHOOL? IN THIS ONLINE FORUM, A PANEL OF U OF A ALUMNI WHO ARE NOW GRADUATE STUDENTS WILL TALK ABOUT THE REALITIES OF GRAD SCHOOL AND WHY THEY CHOSE TO PURSUE A MASTERS OR PHD. THIS CAN HELP YOU DECIDE IF GRADUATE SCHOOL IS RIGHT FOR YOU AND IF SO, HOW TO INCREASE YOUR CHANCE OF ACCEPTANCE TO THE SCHOOL OF YOUR CHOICE.



Chance Lawrence
U of Arizona
Optical Sciences



Charlie Goldberg
UC San Diego
Astrophysics



Mika Lambert
UC Santa Cruz
Astrophysics



Olivia Pitcl
Caltech
Applied Physics



Sarah Stamer
U New Mexico
Astrophysics

Panelist bios:



ATTENTION SENIORS!!!!

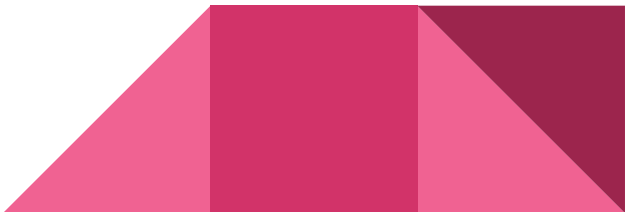
Graduate School Application Workshops



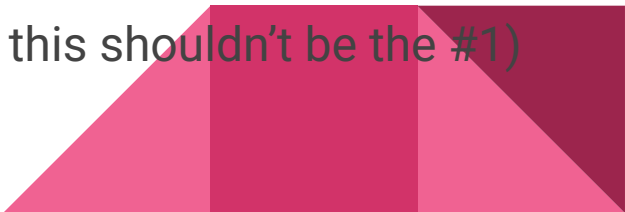
Sign up here to schedule 1:1 meetings with UA faculty members to get feedback on your documents for your grad school applications. Meetings will occur Oct 22 in PAS 236 and Oct 29 in Steward N305, 5:00 – 6:30 pm. You can attend one or both sessions. Meetings outside of those times will be arranged on an individual basis. You will receive templates for your documents in advance. For the meetings, you must have rough drafts ready as Google docs of your CV + personal and/or research statements.



What is graduate school?

- “School” for undergraduates after they graduate → Classes for the first two years.
 - An institution where you will “learn” → to do research, to work with a mentor on a research problem, be a teaching assistant and see how to teach
 - You will specialize - from a general area you find a specific niche to focus on
 - Learning to present work - to folks within your subfield and broadly.
 - Learn how to write - papers, proposals
- 

Why do you want to go to graduate school?

- Do research !!
 - Understand how things work
 - Make a contribution to a field that I love
 - Make that knowledge more accessible globally !
 - Develop new ideas/products/research directions
 - Get some letters PhD!
 - Get the tools to teach and help others enter this field that i love
 - *spite* show yourself and others that you can do this.
 - Open doors for future experiences that require a phd [this shouldn't be the #1)
 - Interdisciplinary work
- 

Components of the applications

- Transcripts
- GRE/PGRE (not all schools require)
- CV
- Letters of Reference
- Research Statement



1. Grades/Transcripts

- 3.0 minimum GPA cut off
- Upper division physics classes matter, as well as gradient of improvement
- Often you're asked for the textbooks used in your classes.
- Letter writers can explain poor grade performance and gradient of improvement (it is ok to ask advisors if they can do so)



GREs

- Cases where optional, not required? See Link [Here](#)
- 40th percentile and above you're fine, maybe even 30th percentile



CV (curriculum vitae, Latin meaning “course of life”)

- See [templates on the TIMESTEP website](#)
 - What should you stress: List of Research experience, outreach/DEI activities + short blurb, focus on products of research (research notes, presentations etc).
 - List any graduate level classes (it's not required!)
 - Add two or three sentences about each research project, including the **research product/outcome** of your project.
 - List Conferences attended and Talks/Posters presented
 - List Leadership roles in even non-scientific activities
 - List Professional activities including sports if they occupied a lot of your time (e.g. varsity)
- 

Example CV: Jay Motka (UA Astro/Physics major, Class of 23)

RESEARCH EXPERIENCE

Numerical Simulations of Charged Black Holes

Relativity Group, Department of Physics, The University of Arizona

August 2022 - May 2023

Project: Simulating a Charged Black Hole in Extremal Limit on Charge using Numerical Relativity Simulations

Undergraduate Thesis Link: <https://repository.arizona.edu/handle/10150/668671>

Advisor: Dr. Vasileios Paschalidis

Goal: To simulate black holes that are closer to the extremal limit on charge than has ever been accomplished before, which will help understand conditions around such black holes and lead to a path for possible theoretical tests of the weak cosmic censorship hypothesis.

Results: Calculated initial conditions for the simulations of charged black holes that can achieve the extremal limit on charge using analytical techniques. This work is published as an undergraduate Honors thesis.

Connecting Cosmological Simulations to Observables in the Infrared

SÍGAME Group, Steward Observatory, The University of Arizona

January 2020 - September 2021

Project: Creating Spectral Cubes and Moment Maps from the Output of a Python Module Named SÍGAME

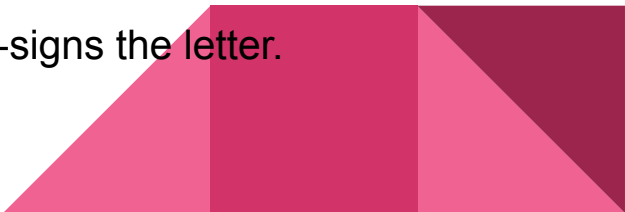
Project Link for Moment0 Maps: https://github.com/jaymotka/moment0_maps

Advisor: Dr. Karen P. Olsen

Goal: To create data visualization tools that correlate with the underlying physics of the simulated galaxies, which can be cross-checked with observations to better understand galaxy formation and evolution.

Results: Created algorithms to generate spectral cubes, moment maps, and line ratio maps from simulated 3D galaxy datacubes, which are output of SÍGAME. My code is submitted to SÍGAME main branch published on GitHub. This work is published in a co-authored paper in The Astrophysical Journal ([Olsen et al. 2021](#)).

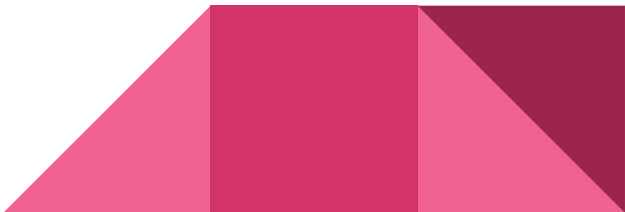
Letters of Reference

- Who to ask -- someone who lays out in detail what you've actually done in research or can speak to/give context for your grades
 - Who can speak to what you have done relative to the opportunities you have had.
 - Who can speak to how well you will do in the future.
 - Sometimes you can have 4 letter writers
 - If something is emphasized in your personal statement (e.g. a research project) they should be providing a letter.
 - Want people who can speak to your undergraduate experience (not highschool). Avoid family as letter writers
 - If you ask a graduate student make sure their advisor co-signs the letter.
- 

Letters of Reference

- When to ask:
 - Earlier the better!
 - Will need to send your letter writers a copy of your CV and personal statement
 - Ask if the person can write you a “strong letter”/”strong and detailed letter”
- How to organize information for your letter writers (spreadsheets/google docs; See [here](#)) and what other information to provide so they write a specific letter (see [here](#))
- Build relationships early !

Office Hours, Research, Clubs/Activities



Reference Letters - What info to provide your letter writer

To request a letter of reference for graduate school

save your answers as a .docx file (named “LastName_year_gradLOR”). Send this file and your current CV (as a pdf named “LastName_year_CV) to Prof. **at least two weeks** before your letter is due, and then remind Prof. by email 3-5 days before the due date.

1. If you have taken classes with me, list them and include your grade and what year you took the course.
2. When (month/year) did you start working in my group, and who did you work most closely with?
3. In 5-10 sentences explain your project in my group. What were you working on, why was it important, and what did you learn?
4. If you have worked somewhere else since leaving my group, what have you been doing? Why is it cool and important?
5. Why do you want to go to graduate school? What is your long-term career goal?
6. Describe why you think you will be a successful graduate student, and how your work in group shows these traits.
7. Describe 1-2 situations from your time in my group that highlight what you like most about doing research, and why.
8. What do you consider the biggest weakness in your application, and why? Is there anything about your application that you would like to me to explain in my letter?
9. What do you consider your greatest strengths, and why?
10. Is there anything personal or sensitive that you want me to exclude from your letter?

Research / Personal Statement

- Advice from UA Astro Grads
 - What to emphasize:
 - **why do you want to go to graduate school???**
 - Committee is Looking for your fit within their department - e.g. in terms of the area of physics/astronomy in which you are interested. Be broad. No one will hold you to it if you get in.
 - Just because you worked in one area as an undergrad doesn't mean you have to do work that as a graduate student
- 

What to emphasize: Academic Performance

- If you took Graduate level classes - explain why did you take this?
- Can explain a lower GPA
- Covid19 Impact



What to emphasize: Discuss Research Experience

- What have you done
- What got you excited?
- Emphasize *skills* gained / What did you learn?
- Illustrate understanding of the bigger picture science goals - WHY does your project MATTER?



What Emphasize: Institution and Legibility

- Address institutional specific details - **why are you applying to this specific school**
 - Look at departmental website and research areas/personnel
 - You can email people at various school to see if they are taking on students
- Make sure the statement comes across as professional (header/footer, **SPELL CHECK**)
- Utilize paragraphs. Emphasize **one main point per** paragraph (e.g. talk about a strength you have - organized/multitask, ambitious, capable of doing research at a graduate level, can code, are a problem solver, good communicator/speaker/team member, are a leader etc)



Costs: UofA Astronomy/Physics: \$90 application fee.

- Fee waivers are possible. Look at the department website. Contact the department directly (usually director of graduate studies) even if it isn't listed on their website.
- **UofA Grad Application Waiver:** if you are a member of these [sponsored programs](#).
- **UofA Astronomy** - Please email Tiffany Deyoe (tdeyoe1@arizona.edu) for information about need-based fee waivers.
- **UofA Physics** - To inquire about need-based application fee waiver, contact the Dr. Erich Varnes (Director of Graduate Studies) with evidence such as previously received need-based federal grants (for example Pell grants).
- **OSTEM scholarships** (\$750; NOV 3rd 2025 deadline):
<https://www.queerinaai.com/grad-app-aid> (they have an application review program)

Applying To Non-US Schools

Canada (astro/physics): Similar expectations and timelines.

Toronto [Astro](#) and [Physics](#) - Dec 12

Chile: Similar expectations, but different timelines.

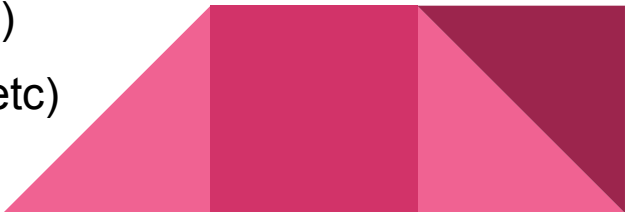
[La Serena](#) (astro): Applications open mid-july, and close Sep 1.

Start date in March. (only need 2 ref letters)

Australia : Similar expectations and timelines

[Australia National University](#) - deadlines Nov 15 (Note: they ask for copies of publications or thesis papers - substantial research)

[U. Sydney Physics](#) - again substantial research (paper etc)



Applying To Non-US Schools

UK: Master's not needed. Deadlines vary. Typically apply to a specific group

Surrey (astro) - Apply to specific groups, listed in January. Interviews are conducted.

Durham (astro)- Application Deadline is Dec 15th. Likely need a publication. 2 letters. Apply to specific groups as listed here.

Oxford, Cambridge - likely need Masters, Publication



Applying To Non-US Schools

Most European countries:

Deadlines vary - Late October, Early November

Direct entry to PhD typically **requires a Masters or equivalent** (e.g. substantial honors thesis project).

Typically apply to **a specific research group** (look for project lists - denmark, spain, germany, netherlands, etc)

There is often an interview process (January). **Practice Presenting your research!**

These are paid positions

Germany IMPRS program deadline: Nov 1/Oct 30

Masters programs have later deadlines (e.g. Jan 31).

These are typically unpaid (but it is substantially cheaper than in the US)

but some German Master's programs cover fees.



Applying to Non-US schools.

East/South Asia

Japan: [NAOJ](#) Deadlines : Oct 8 - Nov 6 [Application Guidelines](#) (often unfunded) [Contact Dr. Eiichi Egami]

India: Integrated PhD programme - 6 years max. Paid positions (reasonable).

Entrance exam required (varies per institution), December-Mid Feb - if pass minimum then invited to apply. Then Interview stage (March -June). Programs focus on course work.

But once you're in, you are well-supported (funding for publications, support from the institute)

[National Centre for Radio Astrophysics](#) (NCRA)

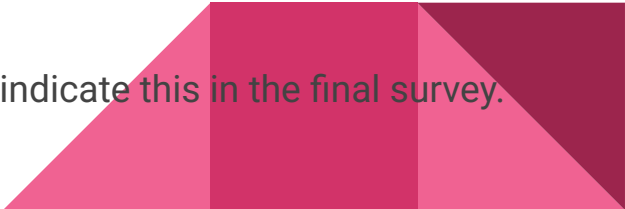
[Tata Institute for Fundamental Research](#) (TIFR)

[International Center for Theoretical Sciences](#) (ICTS)

China: contact Dr. Xiaohui Fan

South Korea: contact Dr. Serena Kim

If you are planning to apply to East/South Asian Graduate Schools please indicate this in the final survey.



PhD in Germany: Example Heidelberg IMPRS

From Christian Burt (Graduated Astronomy 2024):

It is best to have the mindset that you're not submitting an application to a panel that searches for certain traits at a graduate department like in the US, but you're submitting an application to **specific individuals that are deciding if they want to employ you**. My application to IMPRS-HD was completely different from the applications I sent to US institutions.



Masters In Europe: Example Padua, Italy

From Alessandro Bressini (Graduated Astronomy, 2024):

I've found that Arizona has prepared me very well for Padua. Simply discussing the things done in class (like the PHYS 305, ASTR 302, ASTR 400A/B final projects) will let the reader know the extent of your studies. The statement for Padua was only one page long, so I crammed a lot of information about my research experiences, precepting intro physics, and what my aspirations are as well as how Padua can help me achieve those goals. No reference letter needed.

If you are going to study internationally, do as much research about the program as possible, be active in getting things done, talk with as many people as you can, and be prepared to struggle. Once the dust settles, it's absolutely worth it.



Interviews

- “Why do you want to do a PhD”?
- “Why do you want to come to XX Institution?”
- “What attracted you to astrophysics in particular?”
- “Can you give an example of a moment where you struggled in a research project, lab or similar? How did you approach the challenge and overcome it?”
- They may also show you a plot or similar to discuss, just to see how you approach problem solving.

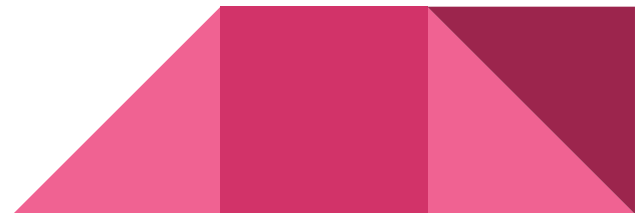


TOEFL

If you have a Degree from a US institution you generally do not need this - but double check each institution. For U of A you do not need TOEFL if you are a UofA student.



Final Survey!



Helpful Resources for Students

- [GradSchoolShopper magazine](#) from AIP
- UA Physics Department- [Graduate Application Procedure & Forms](#)
- UA [Graduate Program](#) in Astronomy and Astrophysics
- [TIMESTEP resources](#)

