What´s up with your career in astronomy?

The players

The rules

Tips to succeed

Dante Minniti

Universidad Andrés Bello

Astronomers, like burglars and jazz musicians, operate best at night.
— Miles Kington.

Many interesting topics to discuss:

What to do next?

Should I join a large collaboration?

What to reply to a bad referee?

What to do if I disagree with a professor?

Women in Astronomy?

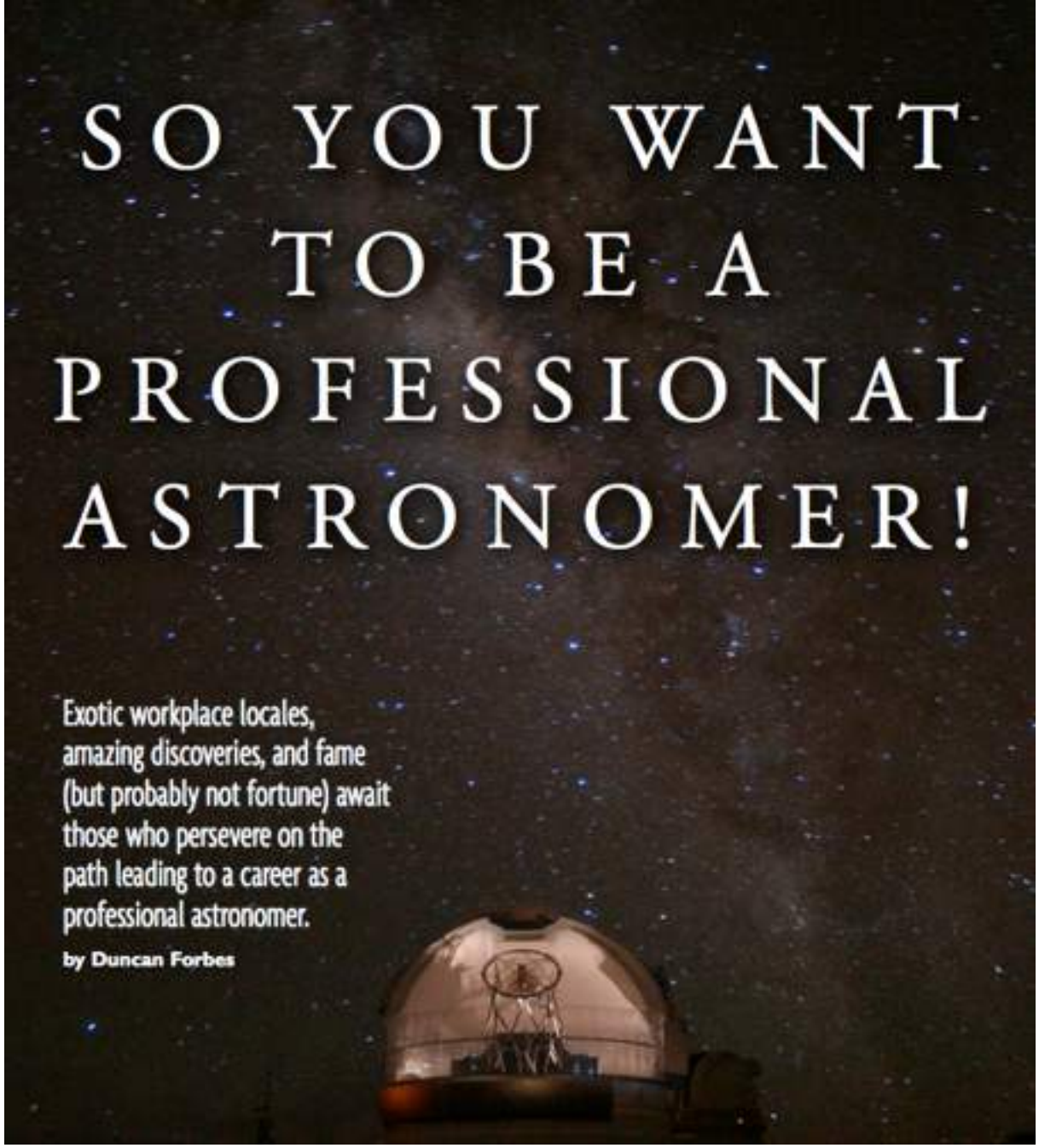
What am I doing wrong?

How to write a paper?

University, Observatory, or Laboratory?

Astronomy vs other Sciences?

(please allow me to speak freely)



Duncan Forbes
Mercury, 2008,
Spring issue, p34

Our own craziness

We have all suffered from our own limitations

Sometimes we feel overwhelmed

We have all had a bad teacher

Don´t worry too much about the future

Work hard and trust yourself

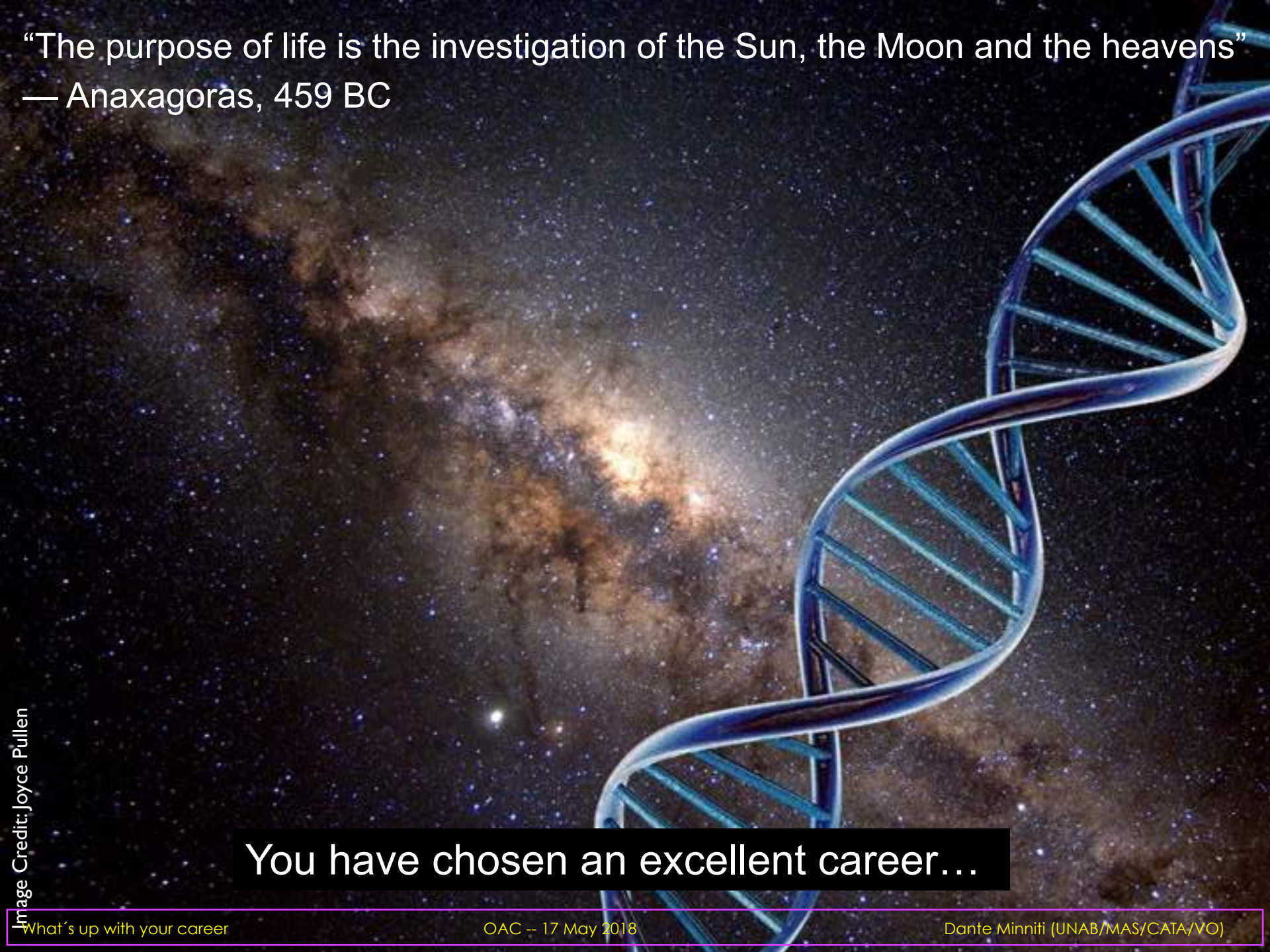
Others have made it, and you also can

We all have had problems, it´s called life

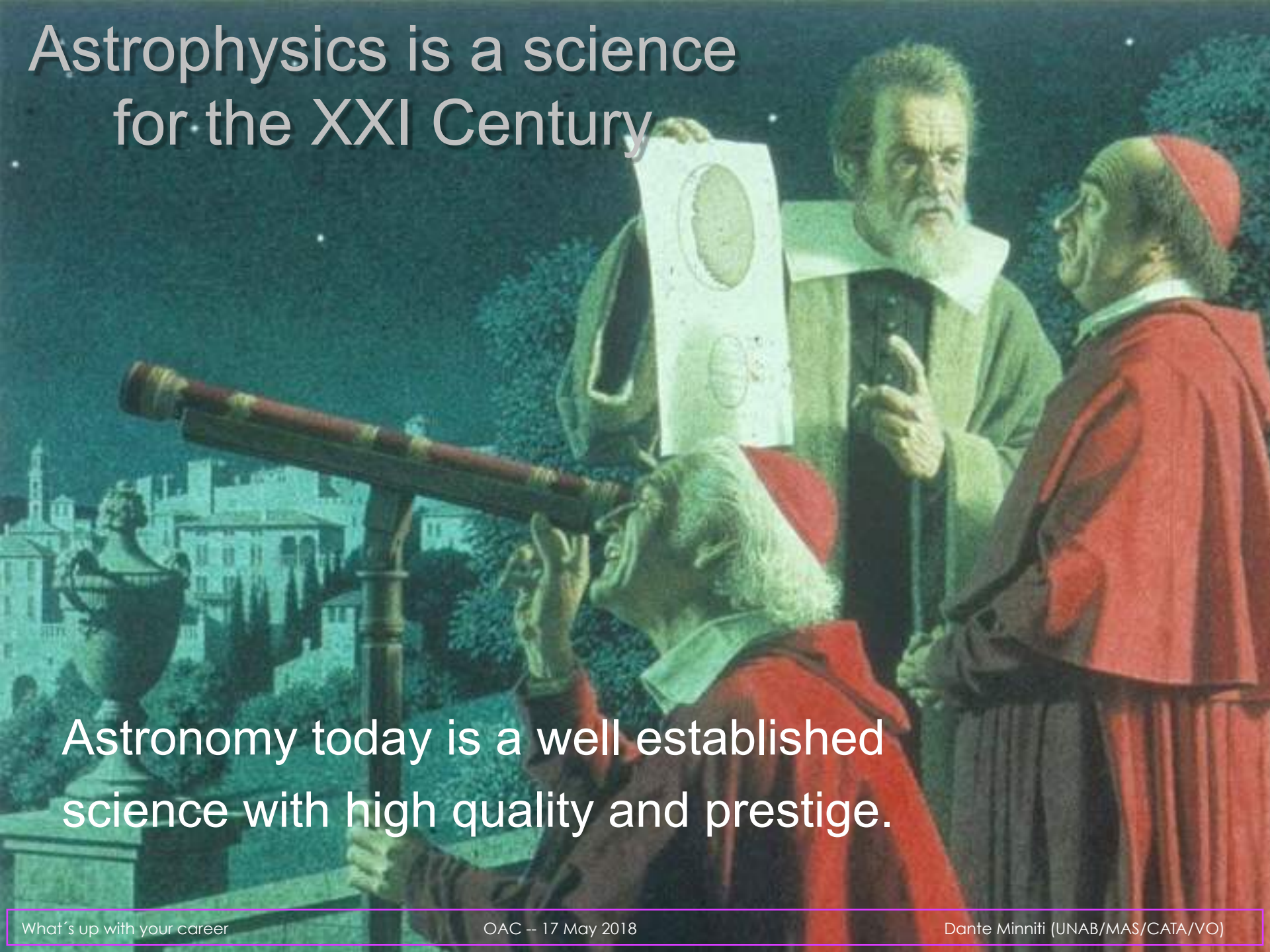
Pink Floyd

Hang in there, surpass your own psychological blocks

Face it: you are not normal, you are an Astronomer!


"The purpose of life is the investigation of the Sun, the Moon and the heavens"
— Anaxagoras, 459 BC
You have chosen an excellent career…
Image Credit: Joyce Pullen

Astrophysics is a science for the XXI Century



Astronomy today is a well established science with high quality and prestige.

Astrophysics is a science for the XXI Century

Important astronomical discoveries are being made.

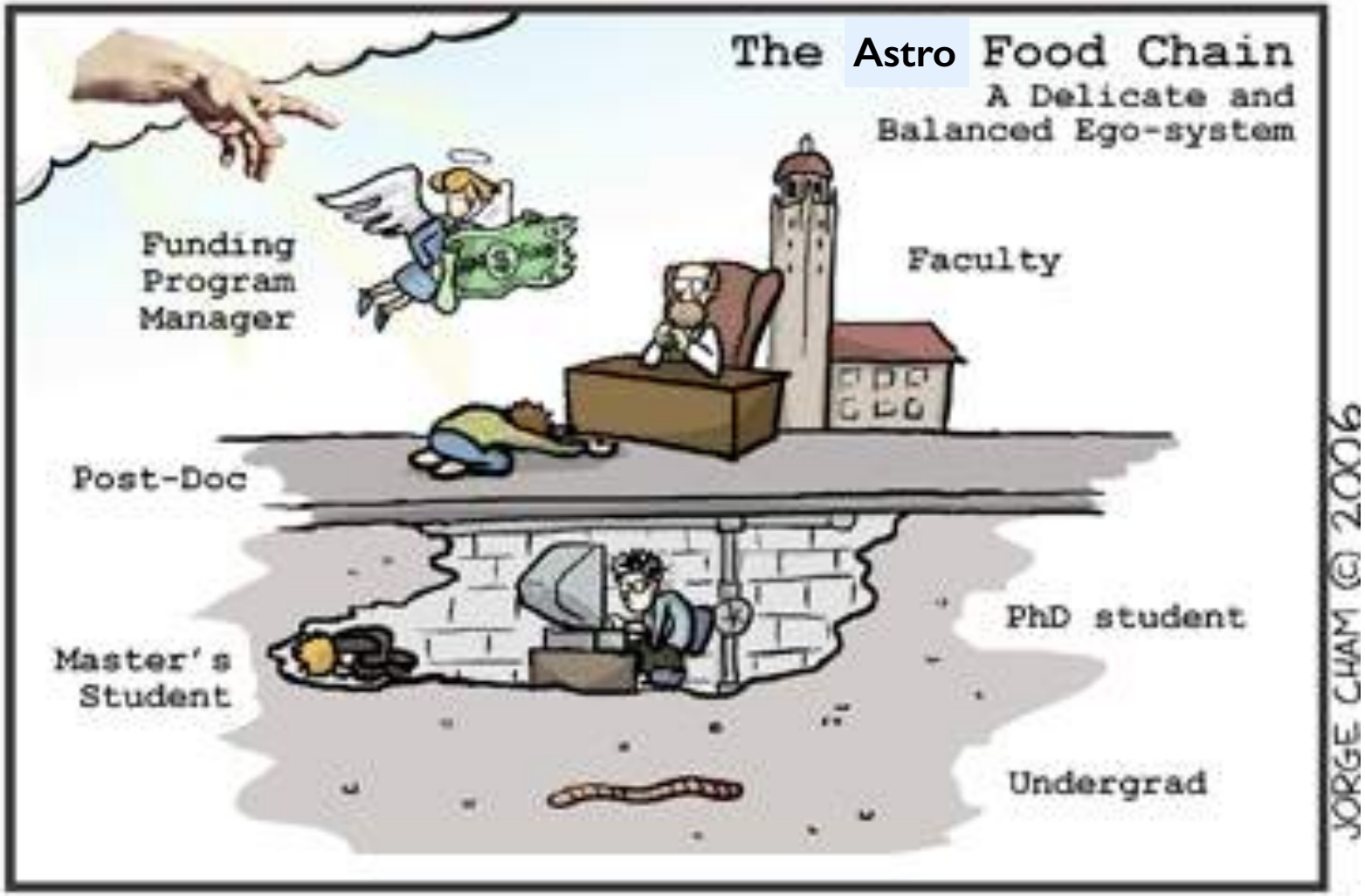
Astrophysics is a science for the XXI Century

We are participating in this adventure.

A Career in Astronomy

- elementary school student
- high school student
- undergraduate university student
- graduate university student
- Observer (TO, etc)
- engineering
- physics
- science teacher
- professional
- 1st postdoc Univ
- 2nd postdoc Univ
- 1st postdoc Obs
- 2nd postdoc Obs
- 3rd postdoc Obs
- industry
- company
- education
- government
- university academics
- assistant professor
- associate professor
- full professor
- director
- staff member
- permanent staff
- director

A Career in Astronomy



A Career in Astronomy

Take all steps, one at a time.
Always give your best.

Astronomy is one of the sublimest fields of human investigation.
— Horace Mann

A Career in Astronomy

The players
Look around you, what do you see?

- professional technicians
- students
- postdocs
- professors
- directors

Do not follow anyone,
but
learn from everyone.

know Maths
know Physics
know Astronomy
speak English
good writer
independent researcher
hard working
mature
good collaborator
good teacher
good supervisor
good referee
decent human being
up to date
rigorous
tough
ethic
ambitious
responsible
neat
excellent

These intense activities take a lot of:

- time
- effort
- equipment
- funding
- space
- support

...

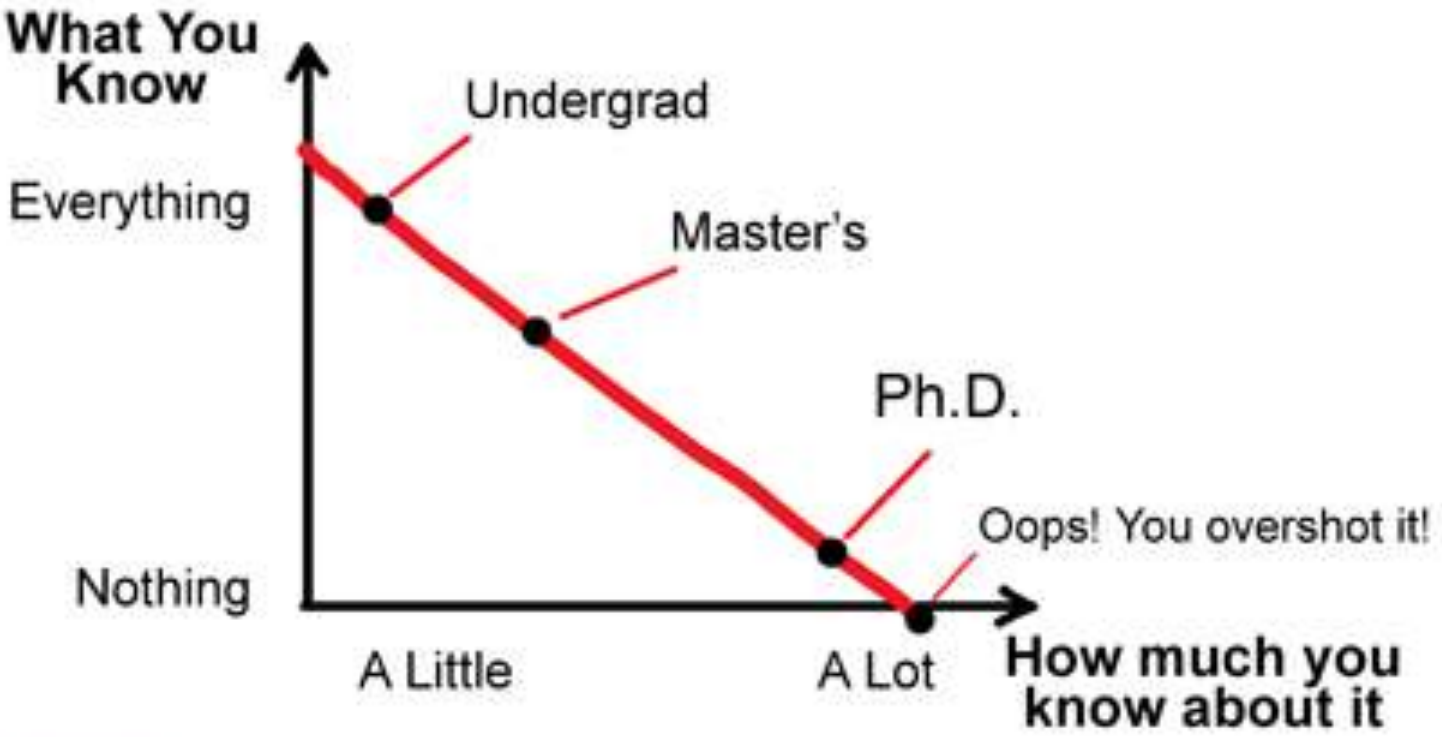
Be honest with yourself: are you sure that this is for you?

Student

Your plans:

Specialize in an area of Astronomy that you like
Increase your knowledge of other areas of Astronomy
Have (create, do) your own research projects
Learn how to publish
Obtain the PhD, and then a postdoc
Make national and international contacts (networking)
Enjoy your career, be happy

What You Know vs How much you know about it



JORGE CHAM © 2008

WWW.PHDCOMICS.COM

Student

You must:

learn
research
grow
learn English
work
publish
deliver

Student

You must
be professional !!!

- be neat, not sloppy
- do not be late
- be rigorous
- express yourself well
- etc.

Students

The PhD: your next frontier...

PhD = world expert on his topic, capable of doing independent and original research.

excellence in scientific research

Students

The PhD: your next frontier...

Postdoc (Fellow)

Your plans:

Become world known expert in your area of Astronomy
Increase your knowledge of other areas of Astronomy
Carry out successful research projects
Be collaborative and competitive
Publish, publish, publish
Obtain a Faculty/Staff position (Learn how to sell yourself)
Increase your international contacts (networking)
Enjoy your career, be happy

What do you mean “networking”?

Go to talks (to all of them).

Ask questions, have lunch with the speaker, etc.

Organize workshops, discussion groups, journal clubs, etc.

Go to conferences, but be picky (only interesting ones).

Work with other members of your Institution.

Keep in touch.

Comment papers, do blogs, twitter, facebook, instagram, linkedin, research gate, etc.

Do I join a large collaboration?

"Succeeding in a Large Research Collaboration", by Andy Howell, AAS Newsletter, Issue 141, p.12-13 (July-August 2008)

Yes and no, it depends on you and on the stage of your career. This can be very good for your career, or not.

Large collaborations have produced most important discoveries.

Some strategies (A. Howell):

- Write papers, this is good for you and everyone.
- Get used to competition.
- Have your collaboration duties match your scientific interests.
- Think creatively, push your ideas.
- Just do it, don´t worry about politics.

University, Observatory or Laboratory?

50% research

- pay
- teaching, admin
- funded
- stable
- need to publish
- less flexible
- can work alone
- rigid, a lot of politics, big egos, career steps
- students, postdocs
- stress

50% research

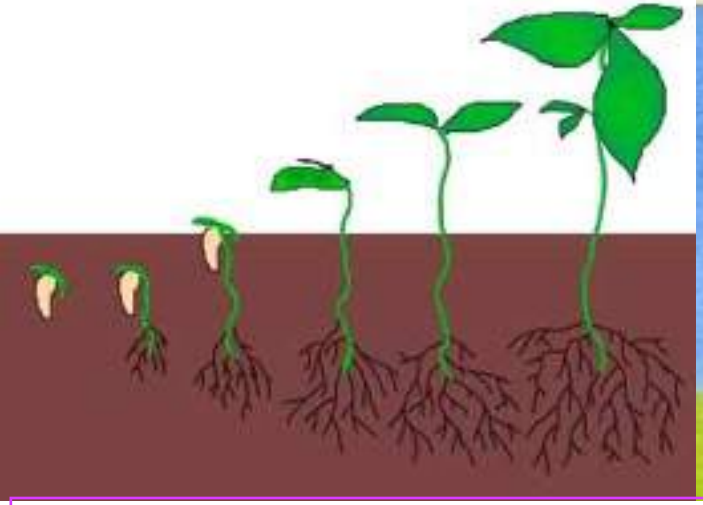
- pay
- observatory duties
- funded
- stable
- need to publish
- less flexible
- team work
- rigid, complaining ambient, little politics, career steps
- students, postdocs
- stress

100% research

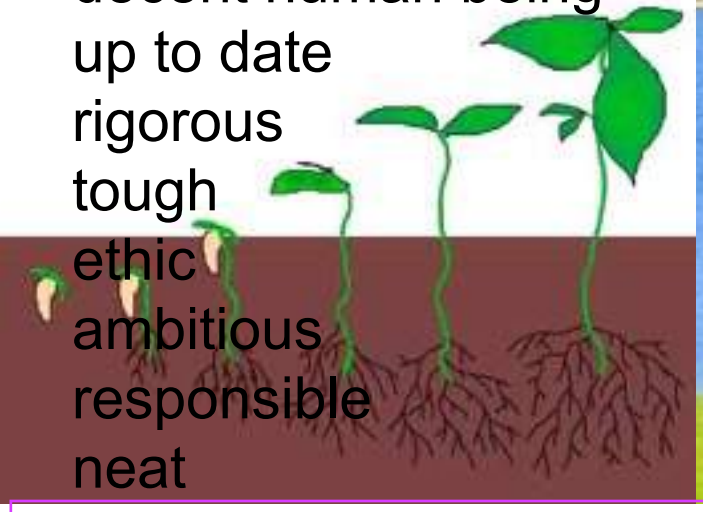
- pay
- research duties
- soft money
- competitive
- need to publish
- flexible
- alone or team
- big egos, fair but cut throat ambient, no career steps
- postdocs
- stress

Professor

Enormous responsibility: to help the creation of another scientist.



know Maths
know Physics
know Astronomy
speak English
good writer
independent researcher
hard working
mature
good collaborator
good teacher
good supervisor
good referee
decent human being
up to date
rigorous
tough
ethic
ambitious
responsible
neat
excellent



Professor

Enormous responsibility: to help the creation of another scientist.

Student

Professor

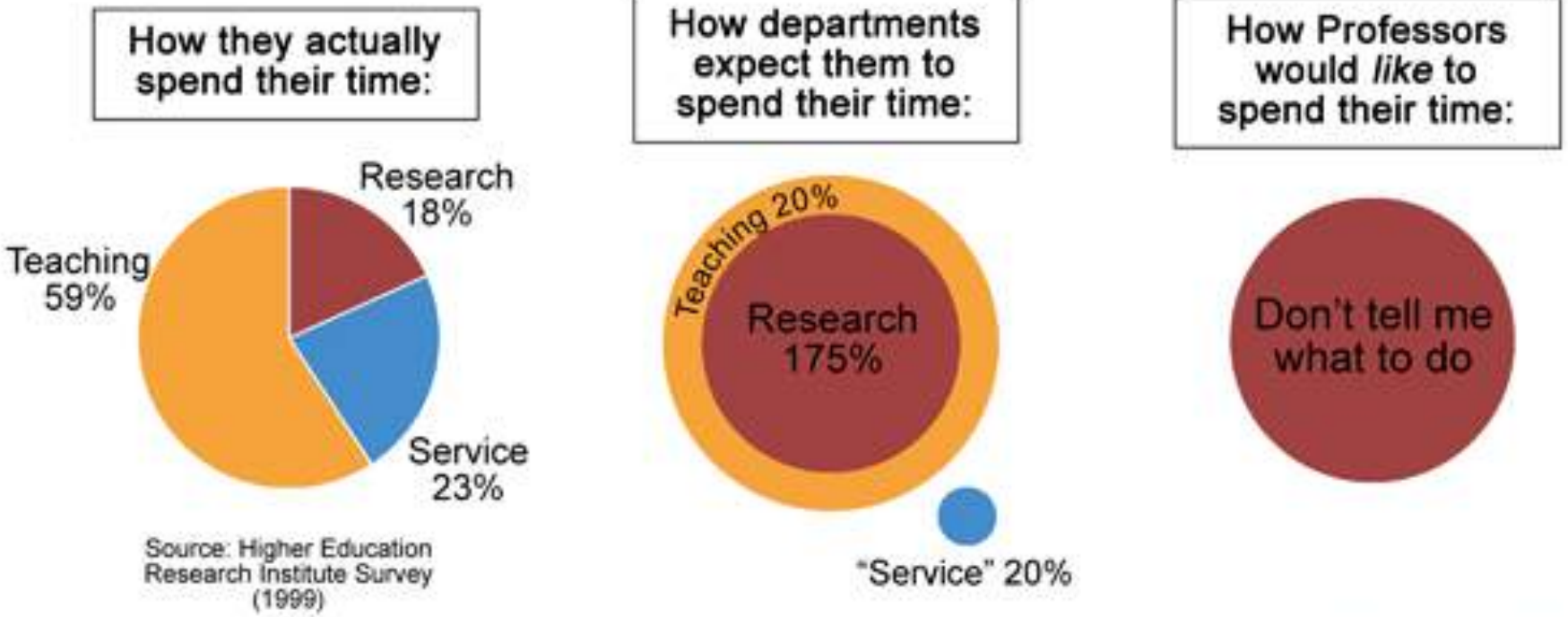
You must:

learn
research
grow
learn English
work
publish
deliver

I must:

teach
research: give project
publish
guide
facilitate
promote
recommend

HOW PROFESSORS SPEND THEIR TIME



My motivations as a teacher

- always learn something new
- make a discovery
- have good ideas
- have time to concentrate without a deadline
- research in a project without interruptions
- help others
- teach, communicate what I know
- foster the success of my students
- have a good book (or papers) to read
- do the projects that I care most
- write a good paper
- that people recognize my efforts
- new gadgets
- travel on vacation
- loved ones
- more mundane pleasures (fútbol, food, fine spirits,...)

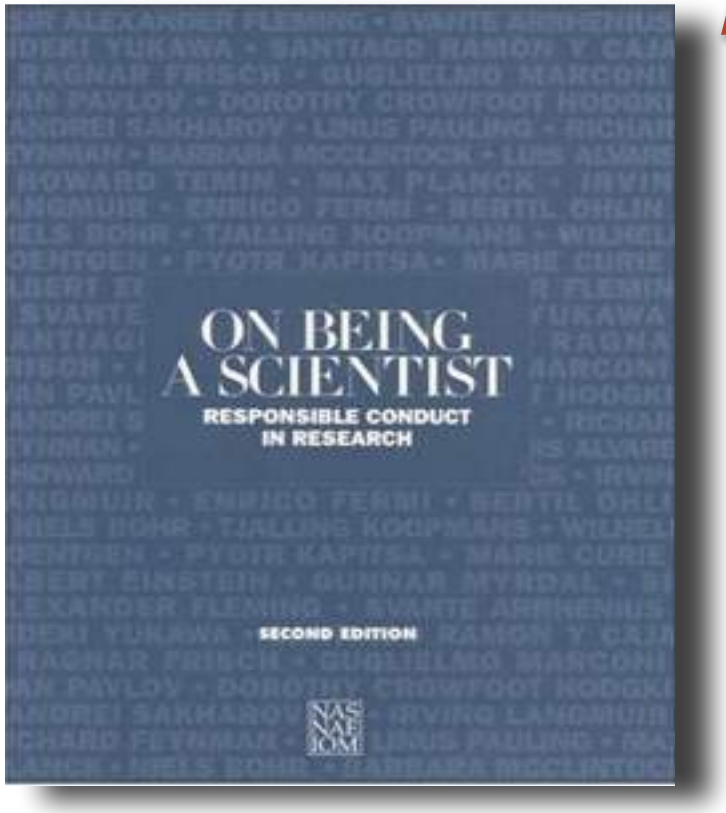
Motivation: be selective

1 book ~100Mb

1 book per week

~3000 books in total in a lifetime

~100.000.000 books in the world



e-book: www.nap.edu/catalog/4917.html

The treasures hidden in the heavens are so rich that the human mind shall never be lacking in fresh nourishment. — Johannes Kepler

Research

Scientific research has difficulties.
Scientists differ in their personalities, strengths, flaws, values and beliefs.
But they all have something in common: **they are hard workers**, they always do a bit more...

"The Scientist" by Coldplay

Nobody said it was easy,
no one ever said it would be so hard,
I´m going back to the start…
(stars)

Research as a student

Take advantage of the opportunities, start doing research focussed on a publication.

We live in special times: fortunately higher education and scientific research are of great value, and you have all your career in front of you.

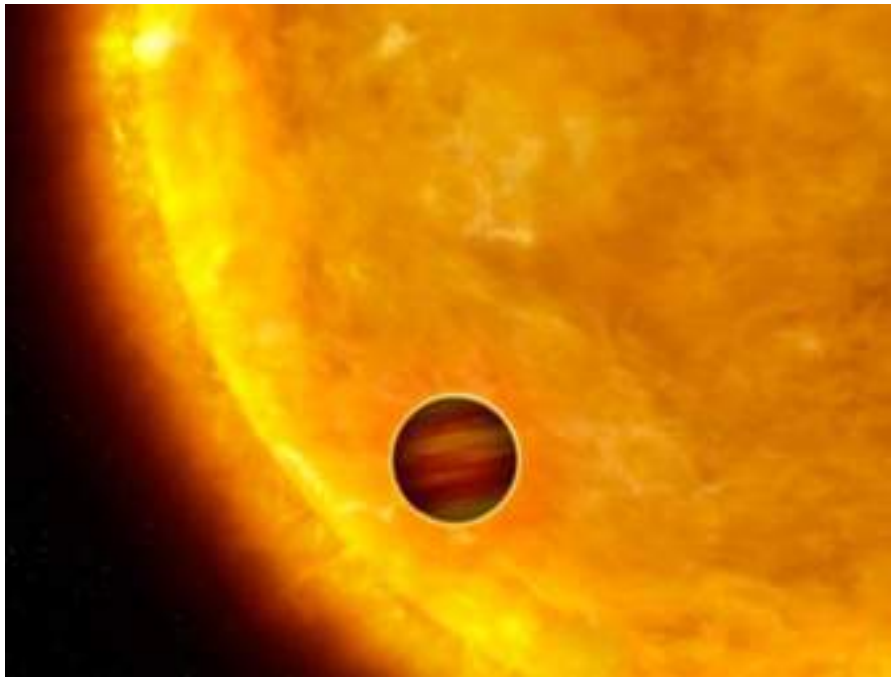
"Don´t ever stop adding to your body of work"

Barak Obama, ASU Commencement speech, 12 May 2009

Research as a student

There are numerous opportunities, take them!

- International contacts
- Research Topics
- Observing experience
- Publications
- Languages
- Travel
- Meetings, Workshops
- Talks



Advice for Graduate Students

"Advice for Grad Students", by Stephen C. Stearns, in Inside Higher Ed, June 6-8, 2011

* Always prepare for the worst
* Nobody cares about you
* You must know why your work is important
* Psychological problems are the biggest barrier
* Start publishing early
* Publish regularly, but not too much

What are you doing wrong?

- Not working hard enough.
- Complaining.
- Not focussed.
- Not enough collaboration with other scientists.
- Writing too many proposals (write papers instead).
- Not going to talks and conferences.

What Not To Do

When looking for a job.

When it comes time to apply for a permanent position, you'll likely be inundated with advice and suggestions. So let me tell you what you **shouldn't** do.

- Use the 'shotgun' approach of applications: many and wide.
- Don't read the application instructions.
- Write it on the last possible day.
- Fail to run the spellchecker.
- Fail to include a well-directed cover letter.
- Don't get a senior colleague to read your application.
- Don't tell your referees you have put their names forward.
- Or tell them, but not until the day before the deadline.

Duncan Forbes — *D. F.*
Mercury, 2008,
Spring issue, p34

Scientific research

SOME DIFFICULTIES:

➡ Funding: even if there is funding, it may be restricted to a specific proposal
➡ Team: number, experience, topics
➡ Equipment: materials, computers, literature access
➡ Environment: collaborators, competitors, referees
➡ Current thinking: fashion or priority topics
➡ Experience: if unexperienced, may waste time, but can come up with new ways
➡ Maturity: honesty, effort, ethics

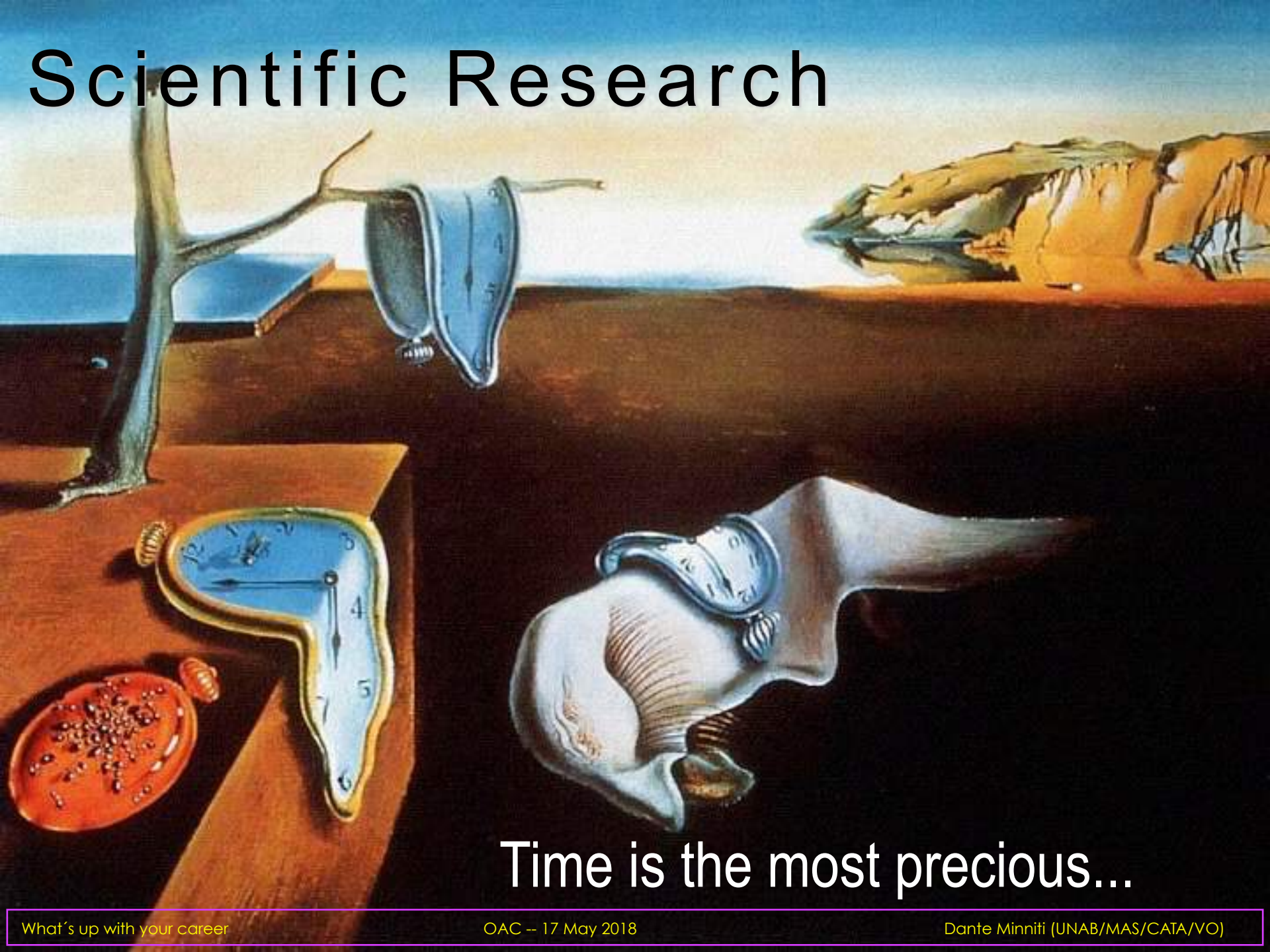
Scientific Research

RECIPES FOR SUCCESS:

- Hard work
- Professional
- Good ideas
- Expert collaborators
- The best instruments
- Time
- Ability to find resources
- Some luck

Michel Mayor

Scientific Research

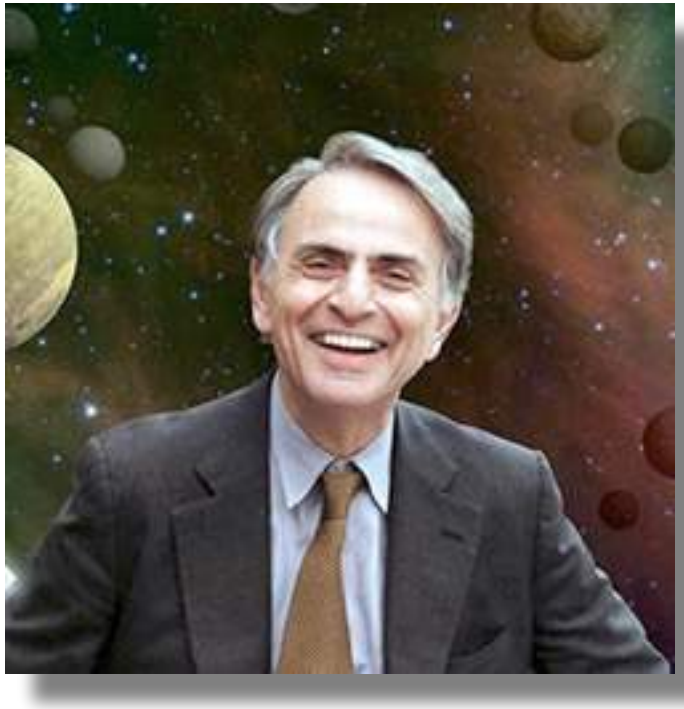


Time is the most precious...

Scientific Research

MEASURES OF SUCCESS:

- Publications ISI
- Citations
- Thesis
- Employment
- Research grants



Carl Sagan

Scientific Research

If you are a woman/man astronomer there are some things that you should be aware of:

Women in Astronomy

Vera Rubin

Women and men are people

Harassment from a power position

The pecking order

The impostor syndrome

http://womeninastronomy.blogspot.com/

Scientific Research

Your research is only finished after it is published.

¿Why publish papers?

Because this is the best way to share our research and discoveries with the community, contributing to Mankind´s knowledge.

But also, *"publish or perish"...*

Because we are subject to a system of evaluation, and publishing allows us to continue successfully in academia, acquire prestige and obtain resources.

Publications

¿Why is it important for a student to write a paper?

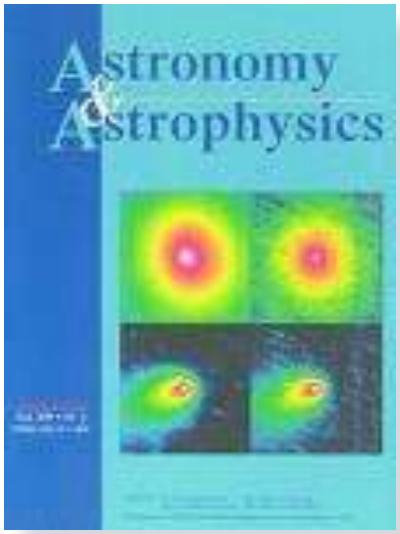
- To improve, consolidate, mature scientifically
- To get a job, resources
- To acquire prestige

What we look at when evaluating a student profile:

- Research
- Grades
- Maturity

Publications

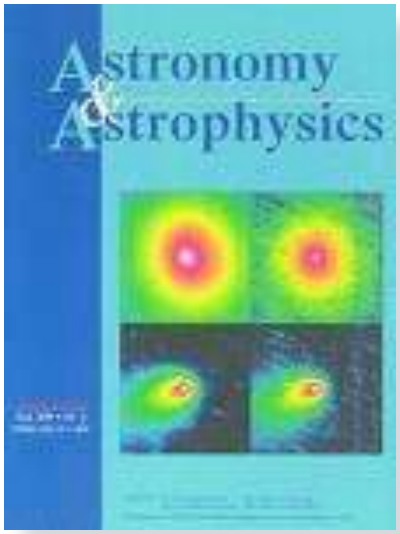
How to write a paper



- Nobody knows more about the research paper that I want to write.
- Nobody can reject an excellent paper.

Publications

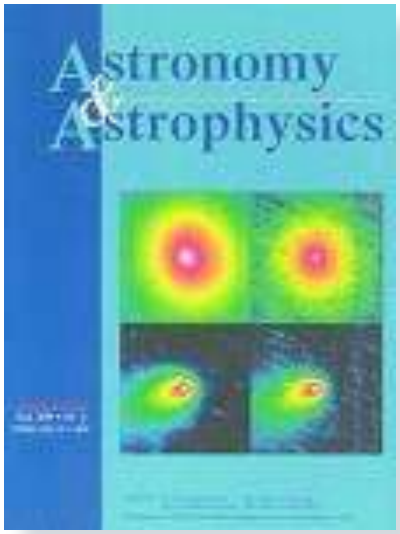
How to write a proposal



- Nobody knows more about the research proposal that I want to write.
- Nobody can reject an excellent proposal.

Publications

How to write a thesis



- Nobody knows more about the research thesis that I want to write.
- Nobody can reject an excellent thesis.

Publications

How to write a paper

- SUGGESTIONS to overcome writer's block:

→ start writing during the research
→ speak the introduction: what has been done?
→ speak the procedure: what are you doing?
→ speak the conclusions: what are you finding?
→ speak the relevance: why are you doing this?
what is the big picture?

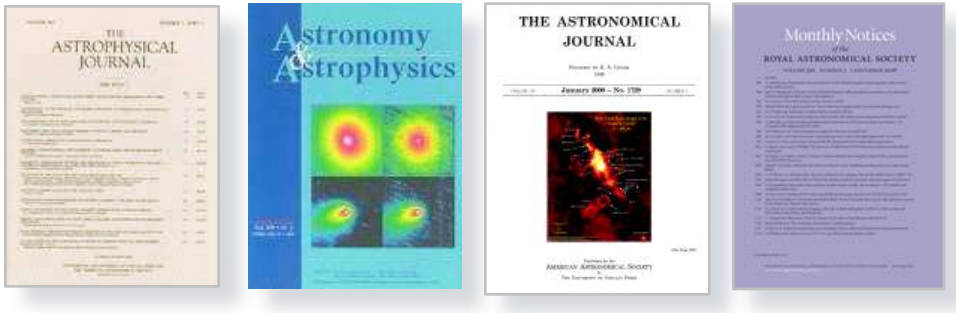
How to write a paper

- Specific suggestions:

→ think the paper
→ do not wait, writing takes time
→ do not miss the deadline
→ ask experienced people
→ collaborate if necessary
→ study similar papers
→ respect the formatting
→ write less, not more
→ read and re-read what you wrote

→ publish, publish, publish

How to write a paper

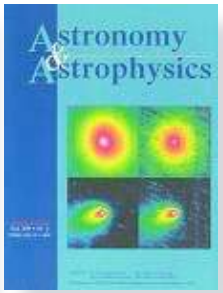


- Suggestions about formalities:

→ Pay attention to the journal style
→ Use spell checker
→ Careful with the grammar
→ Careful with the citations
→ Careful with the figures and tables
→ Neatness counts

→ A sloppy presentation interferes with comprehension and is not a good sign

How to write a paper



- TITLE:
  - → does it have key words?
  - → no “study of”, “observations of”
  - → is it brief?
  - → is it attractive?

- ABSTRACT:
  - → this is very very very important
  - → is it clear enough?
  - → does it summarize the work done?
  - → does it contain the main conclusions?
  - → do not include details, nor previous work

- AUTHORS:
  - → only contributing authors
  - → if only one, write in first person

- THE TITLE IS IMPORTANT !

WHAT´S UP WITH YOUR CAREER IN ASTRONOMY?

"How to grow up as an astronomer"

"What to do with your astronomy career"

"Smart strategies for a young astronomer"

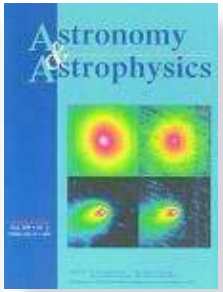
"Tactics for a successful career in astronomy"

"Ideas and resources for your astronomy career"

"Amazingly insane secrets to succeed in astronomy"

"The essential steps and creative ways of an astronomer"

How to write a paper



- IT IS NOT FINISHED YET!
  YOU MUST CHECK:

→ is the text too long?
→ is it well organized?
→ clear procedures?
→ are the relevant cites included?
→ are all figures y tables necessary? relevant?
→ are all figures y tables associated with the text?
→ do they have the right captions?
→ are there explicit conclusions?
→ is the abstract clear?

How to write a paper

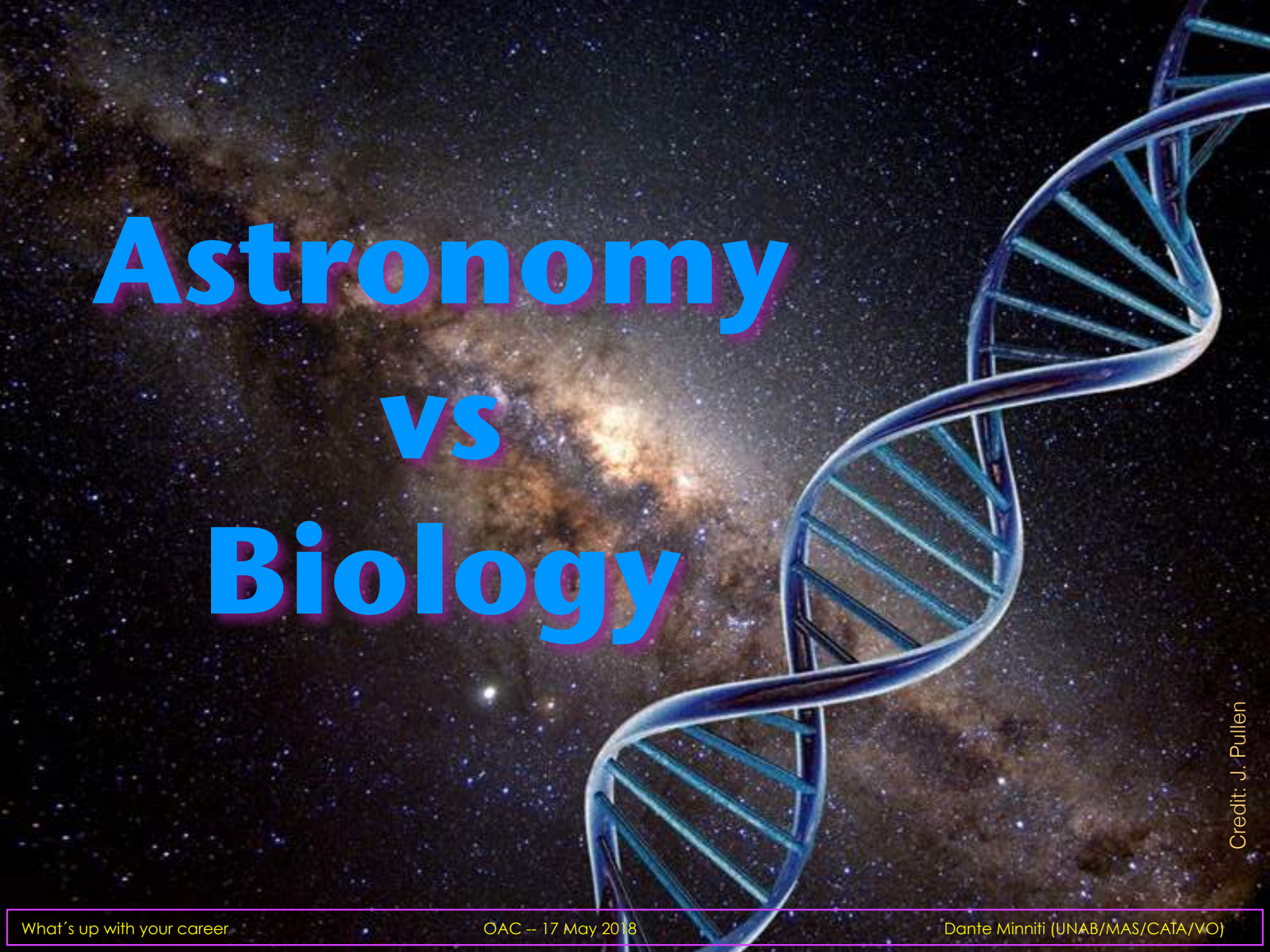
RESULT:

- if accepted, congratulations!

- if rejected...

- SUGGESTIONS to deal with failure:
  - → do not give up
  - → we all had to face rejections
  - → take the referee's comments into account
  - → improve your work and try again

Astronomy vs Biology



Credit: J. Pullen

Astronomy vs Biology

Many similarities

Dynamic sciences

Drive technology

Drive big data

Compete for funding

Astronomy vs Biology

What can you learn from your competitors?

TEN SIMPLE RULES COLLECTION

Proceedings of the Library of Science on Computational Biology

www.ploscompbiol.org

Editorial Articles, 2005-2011

TEN SIMPLE RULES COLLECTION

"Ten Simple Rules for Getting Published", P. E. Bourne, 2005, PLoS Comput. Biol. Vol. 1, Issue 5, e. 57, p. 341

"Ten Simple Rules for Getting Grants", P. E. Bourne & L. M. Chalupa, 2006, PLoS Comput. Biol. Vol. 2, Issue 2, e. 12, p. 59

"Ten Simple Rules for Reviewers", P. E. Bourne & A. Korngreen, 2006, PLoS Comput. Biol. Vol. 9, Issue 9, e. 10, p. 973

"Ten Simple Rules for a Successful Collaboration", Q. Vicens & P. E. Bourne, 2007, PLoS Comput. Biol. Vol. 3, Issue 3, e. 44, p. 335

"Ten Simple Rules for Making Good Oral Presentations", P. E. Bourne, 2007, PLoS Comput. Biol. Vol. 3, Issue 4, e. 77, p. 593

"Ten Simple Rules for Doing Your Best Research", T. C. Erren, P. Cullen, M. Erred & P. E. Bourne, 2007, PLoS Comput. Biol. Vol. 3, Issue 10, e. 213, p. 1839

"Ten Simple Rules for Graduate Students", J. Gu & P. E. Bourne, 2007, PLoS Comput. Biol. Vol. 3, Issue 11, e. 229, p. 2045

"Ten Simple Rules for Aspiring Scientists in a Low-Income Country", E. Moreno & J. M. Gutierrez, 2008, PLoS Comput. Biol. Vol. 4, Issue 5, e. 1000024, p. 1

"Ten Simple Rules for Building and Maintaining a Scientific Reputation", P. E. Bourne & V. Barbour, 2011, PLoS Comput. Biol. Vol. 7, Issue 6, e. 10002108, p. 1

"Ten Simple Rules for Organizing a Scientific Meeting", M. Corpas, N. Gehlenborg, S. C. Janga & P. E. Bourne, 2008, PLoS Comput. Biol. Vol. 4, Issue 6, e. 1000080, p. 1

CONCLUSIONS

- Always be professional.
- Take advantage of the opportunities.
- Ideas: learn from everybody.
- Excellence: work more than anybody.
- Publish, publish, publish.

CONCLUSIONS II

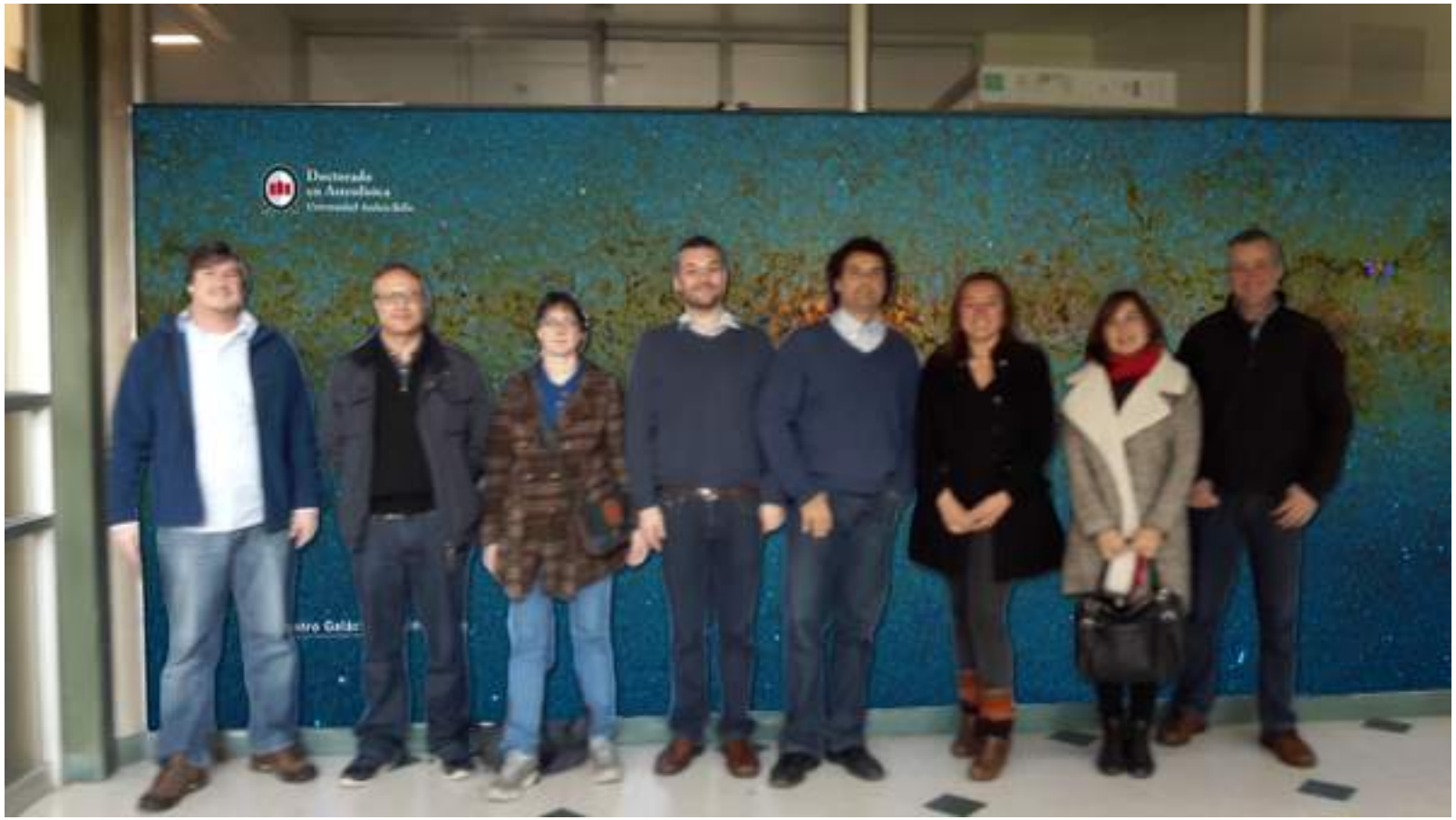
✦ As far as I can remember, I loved Astronomy. And I am still enthusiastic about my profession.

✦ Congratulations because you have chosen a very rewarding career, and it is worth to be passionate about it.

✦ Be ambitious, your future can be bright, it depends on you…

www.astro.unab.cl

An Astrophysics PhD program by a young international team



This is the discipline that deals with the universe's divine revolutions, the stars' motions, sizes, distances, risings and settings . . . for what is more beautiful than heaven?
— Nicolaus Copernicus, 'On the Revolutions of Heavenly Spheres,' 1543