Physics and Space Sciences

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Education is a continuous process and learning never stops

Classical physics, statistical mechanics, relativity, electromagnetism and quantum mechanics form the backbone of a physics degree, with a little more work in optics and basic astrophysical processes added for specialization in astronomy.

The courses usually end in the first semesters of the master's degree and the rest of your time is spent on your thesis research under the guidance of the supervising professor. That's where the real education comes in: you learn how to be a real scientist, not just gather knowledge.

You learn what the current state of your science is, which research groups in which countries are making new discoveries or working on groundbreaking issues, and you begin to actively cultivate your inspiration, intuition, imagination, and creativity on how to overcome current limits of human understanding of our world. No one is demanding that you are already familiar with all the difficulties and challenges that scientists face. This is also the meaning of the long course of learning during your studies and after your career. And that's what makes this career so fascinating.
What you only need is determination, persistence and passion.

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What are the professional prospects of a Physicist?

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Physics is of particular importance among STEM Sciences and modern technology, and can form the background of other scientific pursuits and professional career fields. Physics as a subject has a wide range of options as during the degree students have the opportunity to acquire a wealth of knowledge with a focus on physics.

They also acquire extraordinary skills: They understand laws and principles that govern the world, seeing things from another perspective. They have acquired knowledge about practical issues, about engineering, IT and mathematics. They have acquired the ability to solve complex problems, manage laboratory equipment, understand complex scientific terminologies.

Professionally, graduates of the Physics department have a multitude of options. They can work in education, in physics research centers and with a master's degree the options become much more, with greater flexibility.

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Examples of specializations / fields of work are:

- Specialist/scientist in various services
- Meteorologist
- Environmentalist
- Radiophysicist, responsible for radiation laboratories)
- Scientific writer (production and publication of books/papers)

- And many more

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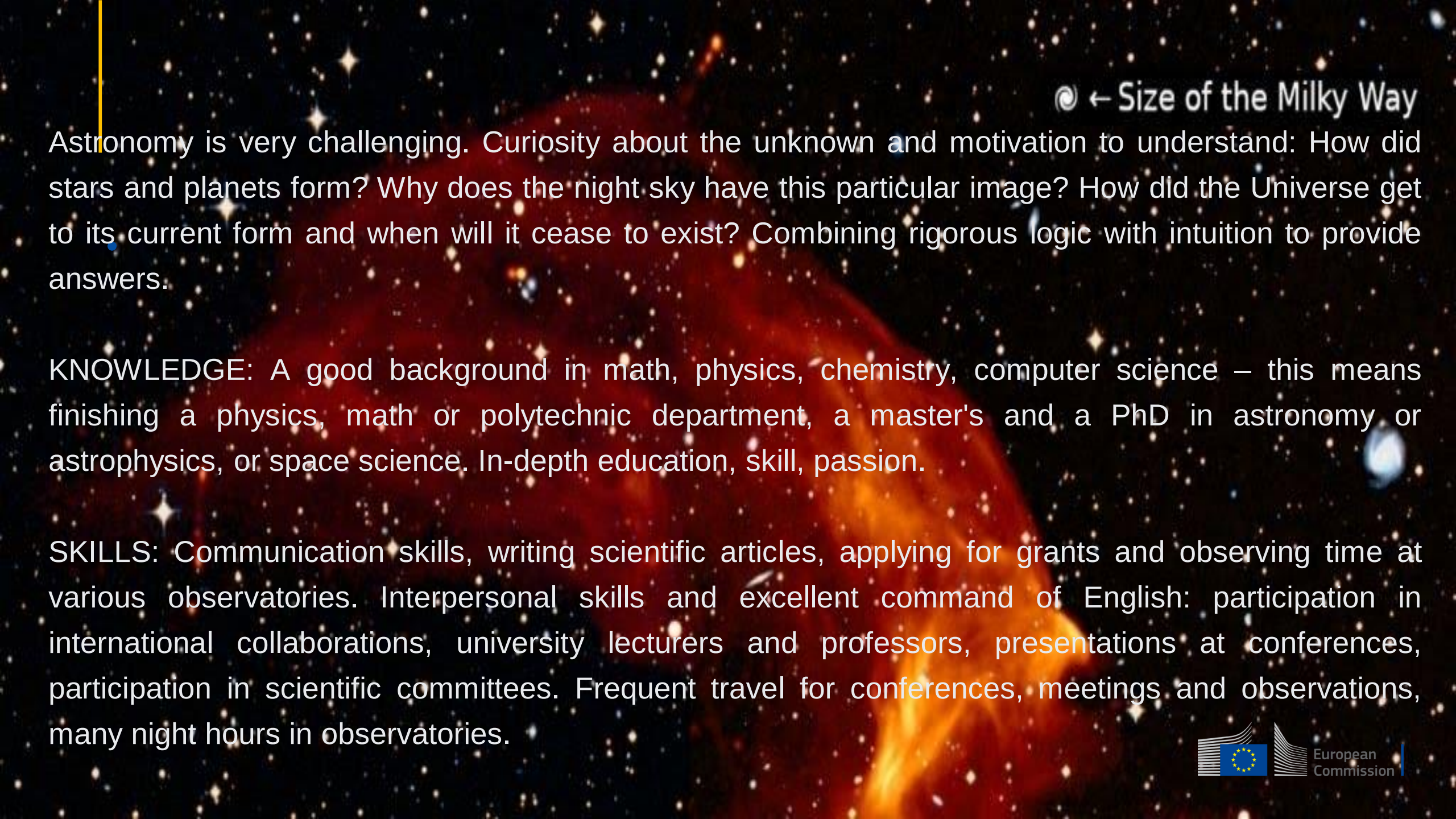
What do you need in order to become an astronomer?



Astronomy is very challenging. Curiosity about the unknown and motivation to understand: How did stars and planets form? Why does the night sky have this particular image? How did the Universe get to its current form and when will it cease to exist? Combining rigorous logic with intuition to provide answers.

KNOWLEDGE: A good background in math, physics, chemistry, computer science – this means finishing a physics, math or polytechnic department, a master's and a PhD in astronomy or astrophysics, or space science. In-depth education, skill, passion.

SKILLS: Communication skills, writing scientific articles, applying for grants and observing time at various observatories. Interpersonal skills and excellent command of English: participation in international collaborations, university lecturers and professors, presentations at conferences, participation in scientific committees. Frequent travel for conferences, meetings and observations, many night hours in observatories.

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What exactly does an astronomer / astrophysicist?

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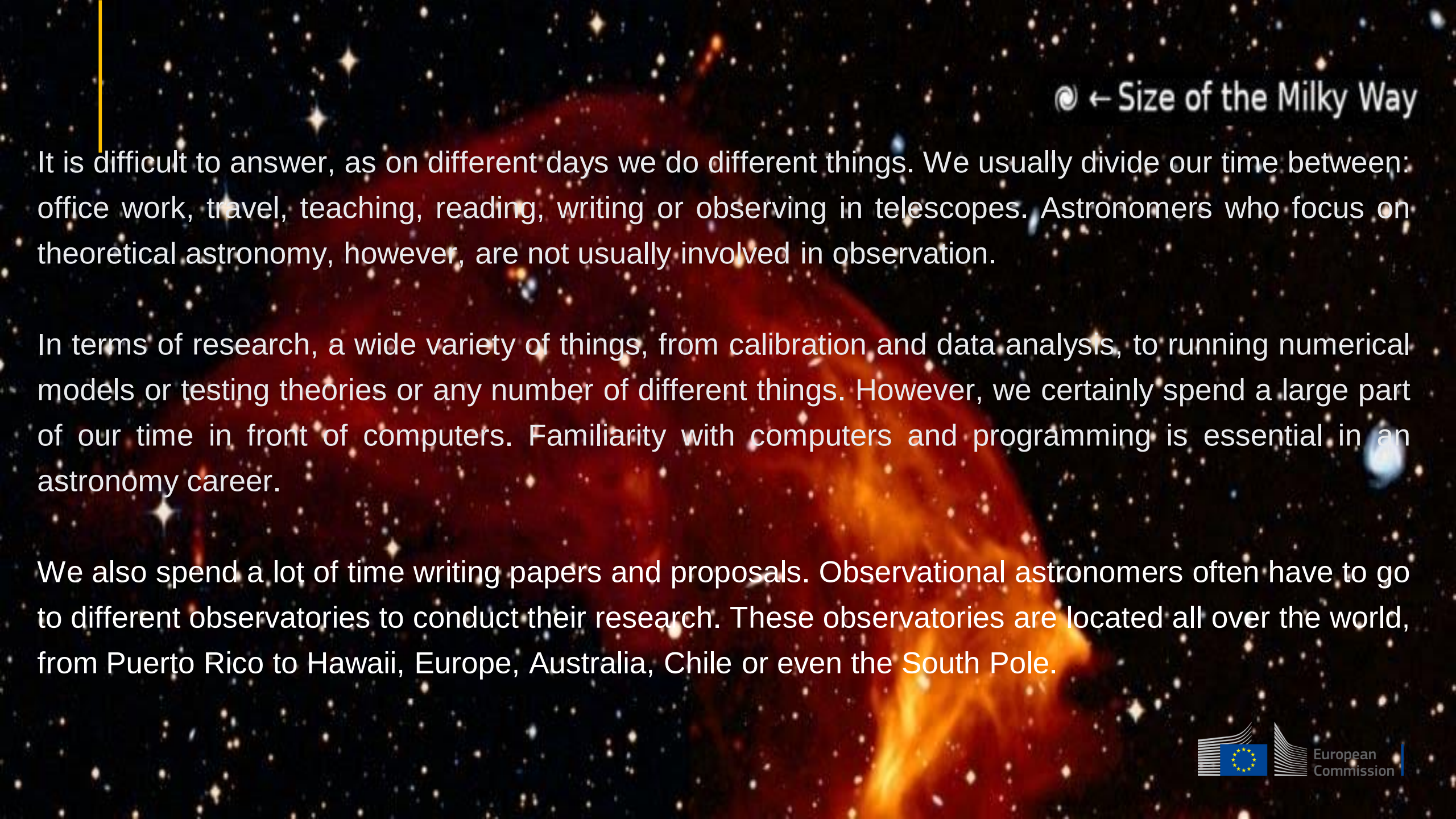


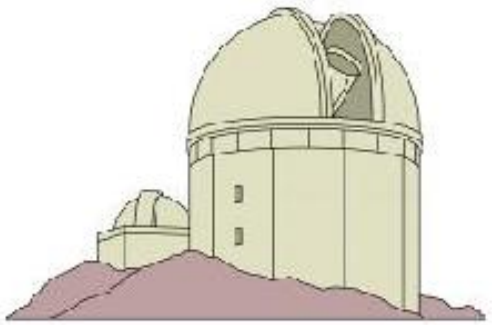
It is difficult to answer, as on different days we do different things. We usually divide our time between: office work, travel, teaching, reading, writing or observing in telescopes. Astronomers who focus on theoretical astronomy, however, are not usually involved in observation.

In terms of research, a wide variety of things, from calibration and data analysis, to running numerical models or testing theories or any number of different things. However, we certainly spend a large part of our time in front of computers. Familiarity with computers and programming is essential in an astronomy career.

We also spend a lot of time writing papers and proposals. Observational astronomers often have to go to different observatories to conduct their research. These observatories are located all over the world, from Puerto Rico to Hawaii, Europe, Australia, Chile or even the South Pole.

Astronomical Observatory Map

Data from year 2002



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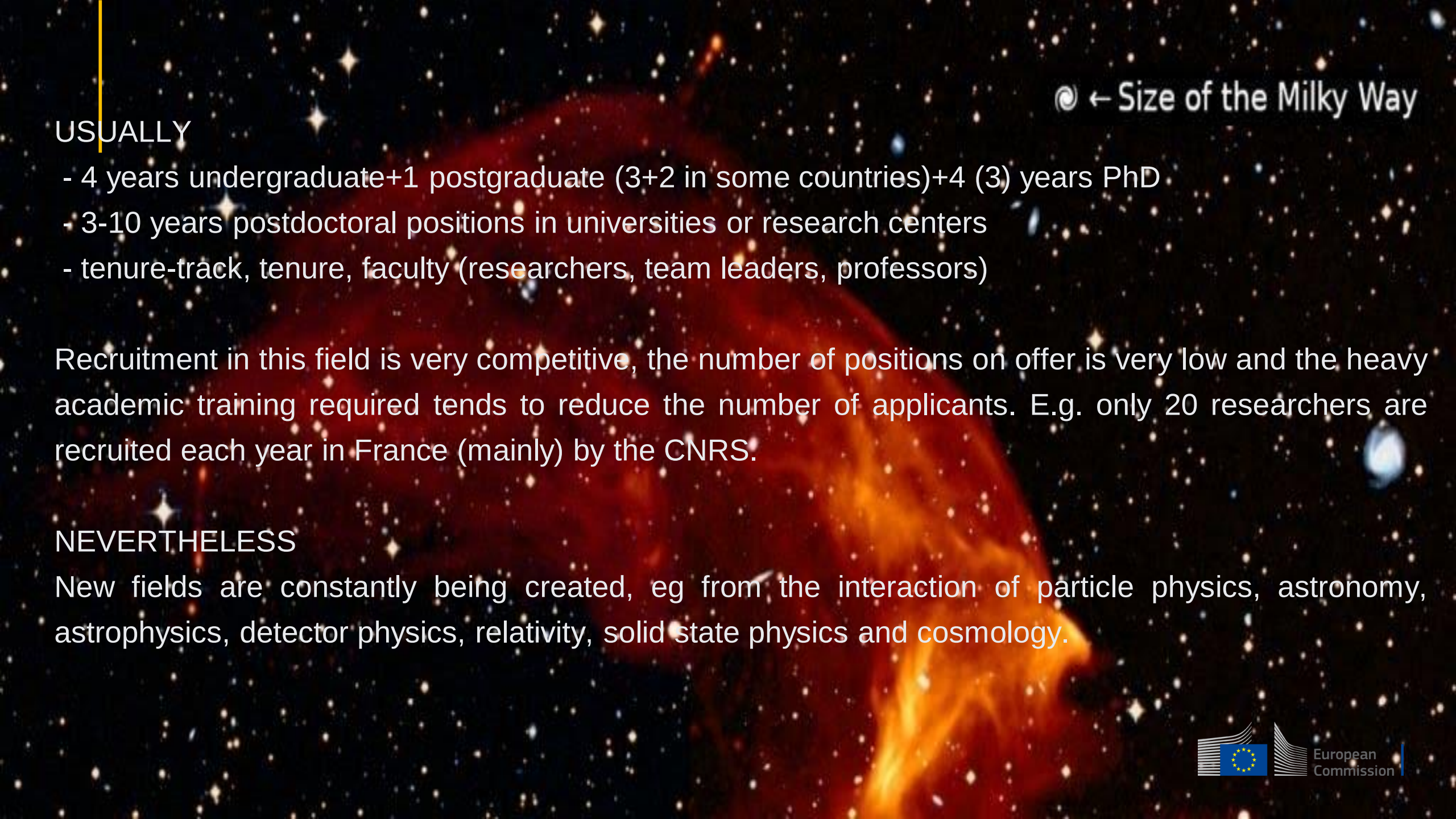
What is the career path of an astrophysicist?



USUALLY

- 4 years undergraduate+1 postgraduate (3+2 in some countries)+4 (3) years PhD
- 3-10 years postdoctoral positions in universities or research centers
- tenure-track, tenure, faculty (researchers, team leaders, professors)

Recruitment in this field is very competitive, the number of positions on offer is very low and the heavy academic training required tends to reduce the number of applicants. E.g. only 20 researchers are recruited each year in France (mainly) by the CNRS.

NEVERTHELESS

New fields are constantly being created, eg from the interaction of particle physics, astronomy, astrophysics, detector physics, relativity, solid state physics and cosmology.

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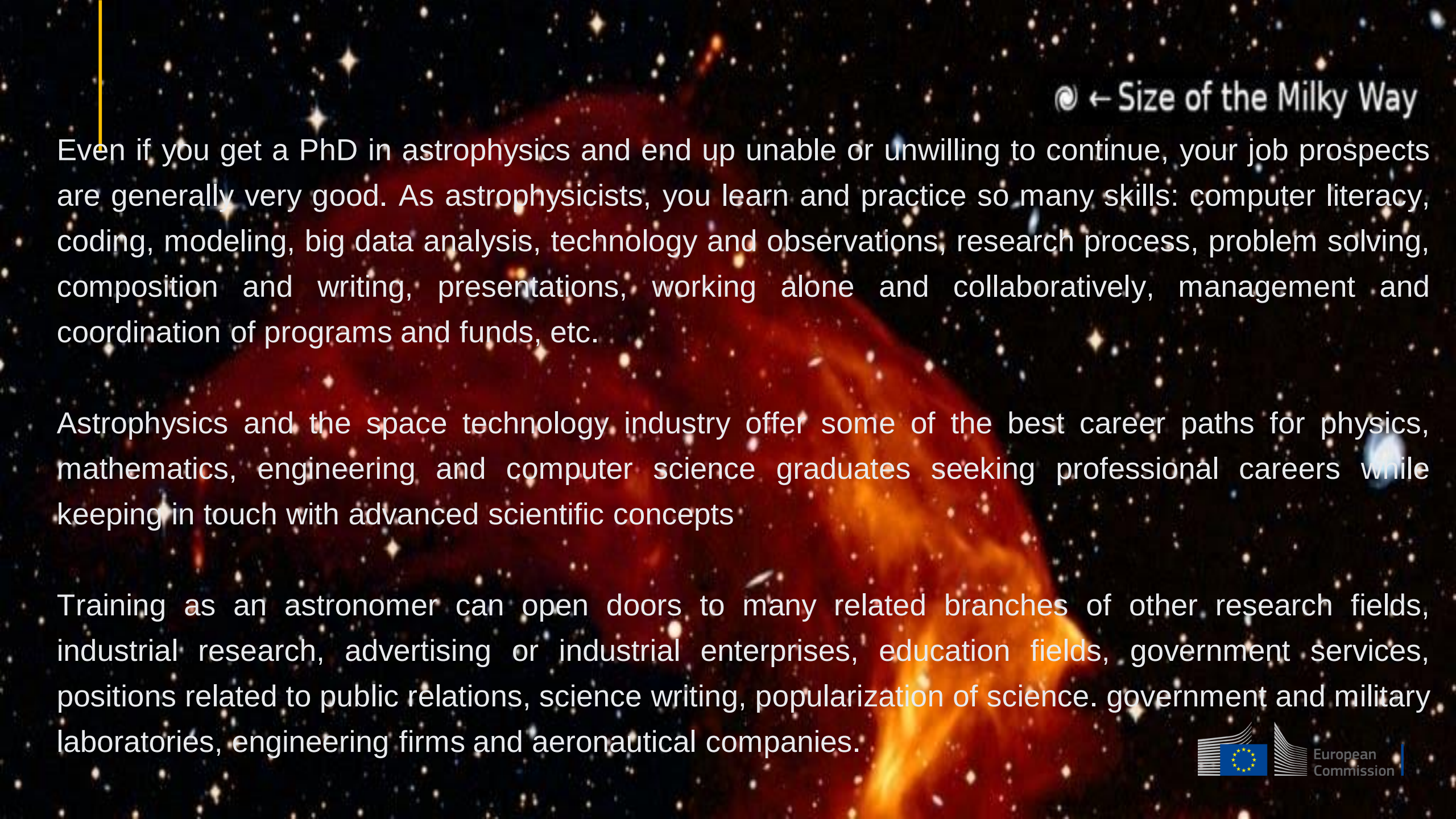

Even if you get a PhD in astrophysics and end up unable or unwilling to continue, your job prospects are generally very good. As astrophysicists, you learn and practice so many skills: computer literacy, coding, modeling, big data analysis, technology and observations, research process, problem solving, composition and writing, presentations, working alone and collaboratively, management and coordination of programs and funds, etc.

Astrophysics and the space technology industry offer some of the best career paths for physics, mathematics, engineering and computer science graduates seeking professional careers while keeping in touch with advanced scientific concepts

Training as an astronomer can open doors to many related branches of other research fields, industrial research, advertising or industrial enterprises, education fields, government services, positions related to public relations, science writing, popularization of science. government and military laboratories, engineering firms and aeronautical companies.

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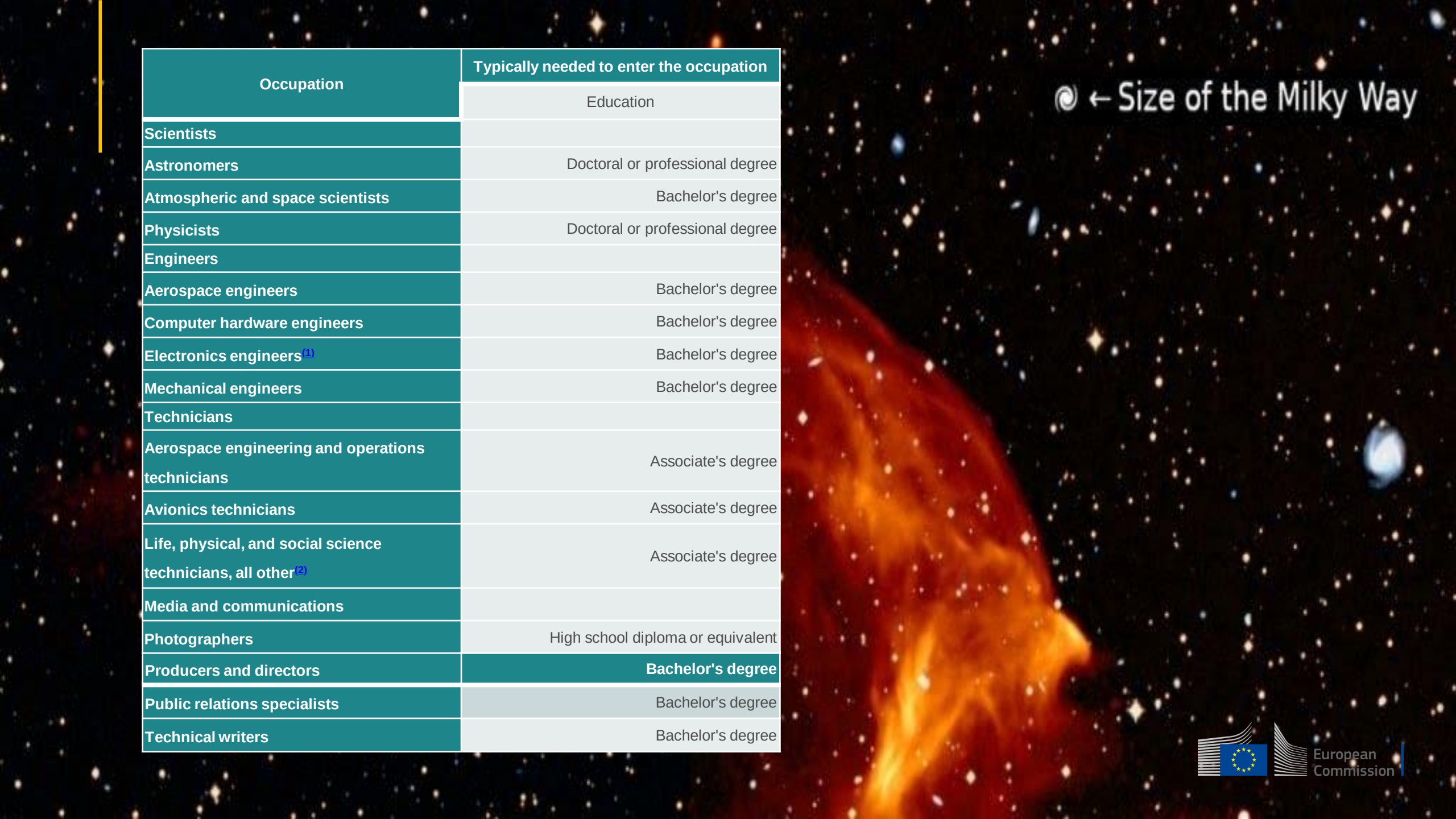
The field of space technologies, applications and services has seen significant momentum in recent years both within the European Union and at global level: Galileo (for navigation) and Copernicus (for earth observation) space programs in combination with the new generation of Sentinel satellites offer many opportunities for research, creation, innovation and development of new technologies, applications and services to both public and private sector actors. Joint EU actions and ESA and the space-related framework of the Horizon Europe Programme.

In Greece, the space sector has shown remarkable dynamics in recent years with a significant number of public and private sector entities demonstrating significant research, industrial and commercial activities related to space technologies, applications and services. The Hellenic Space Center (HEL.KE.D) gives increased priority to the research and development of space technology, as well as to space applications.

Examples: transport security, maritime modernization, national microsatellite program, environment and climate change, positioning and navigation, telecommunications, emergency prevention and response (eg earthquakes, floods, forest fires), modernization of public administration, etc.

Occupation	Typically needed to enter the occupation
	Education
Scientists	
Astronomers	Doctoral or professional degree
Atmospheric and space scientists	Bachelor's degree
Physicists	Doctoral or professional degree
Engineers	
Aerospace engineers	Bachelor's degree
Computer hardware engineers	Bachelor's degree
Electronics engineers[1]	Bachelor's degree
Mechanical engineers	Bachelor's degree
Technicians	
Aerospace engineering and operations technicians	Associate's degree
Avionics technicians	Associate's degree
Life, physical, and social science technicians, all other[2]	Associate's degree
Media and communications	
Photographers	High school diploma or equivalent
Producers and directors	**Bachelor's degree**
Public relations specialists	Bachelor's degree
Technical writers	Bachelor's degree



Can I become an astronaut?

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Bachelor's degree from an accredited institution in engineering, biological science, physical science or mathematics is required. At least 1,000 hours of pilot time in a jet aircraft. Flight test experience is highly desirable.

Astronauts are called pilots or scientists depending on their training, knowledge and the tasks they undertake on a mission. Astronaut pilots are either pilots (control the space shuttles or spacecraft) or commanders (responsible for the vehicle, crew, mission success and safety) Mission Specialist Astronauts (operating systems, experiments, spacewalks) Scientists in a special mission (responsible for conducting and monitoring experiments in space)

Almost all countries with a national space exploration program have their own astronaut recruitment and training agency. ESA accepts 15 astronauts at a time (for 20 thousand applications). They need to know English, be a graduate of a university or equivalent school of science, medicine or mechanical engineering and have at least three years of experience. Knowledge of aircraft handling is considered a particular advantage. The necessary characteristics of the candidates include a practical way of reasoning, a good memory, the ability to orientate and a positive reaction to adverse conditions.

How much money does an astrophysicist make?

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The salary can vary a lot, it depends on the country, experience, type of institution, previous positions and abilities, for example in the USA, it can start from $35,000/year to $110,000/year, but it can reach up to $135,000 /year (eg NASA, high-ranking positions, etc.).

1. Senior technical writer $80,621 per year
2. College professor $83,997 per year
3. Planetarium director $85,489 per year
4. Meteorologist $85,589 per year
5. Research scientist $87,849 per year
6. Climatologist $94,110 per year
7. Aeronautical engineer $99,796 per year
8. Astronomer $111,090 per year
9. Astrophysicist $119,580 per year
10. Physicist 125,280 per year

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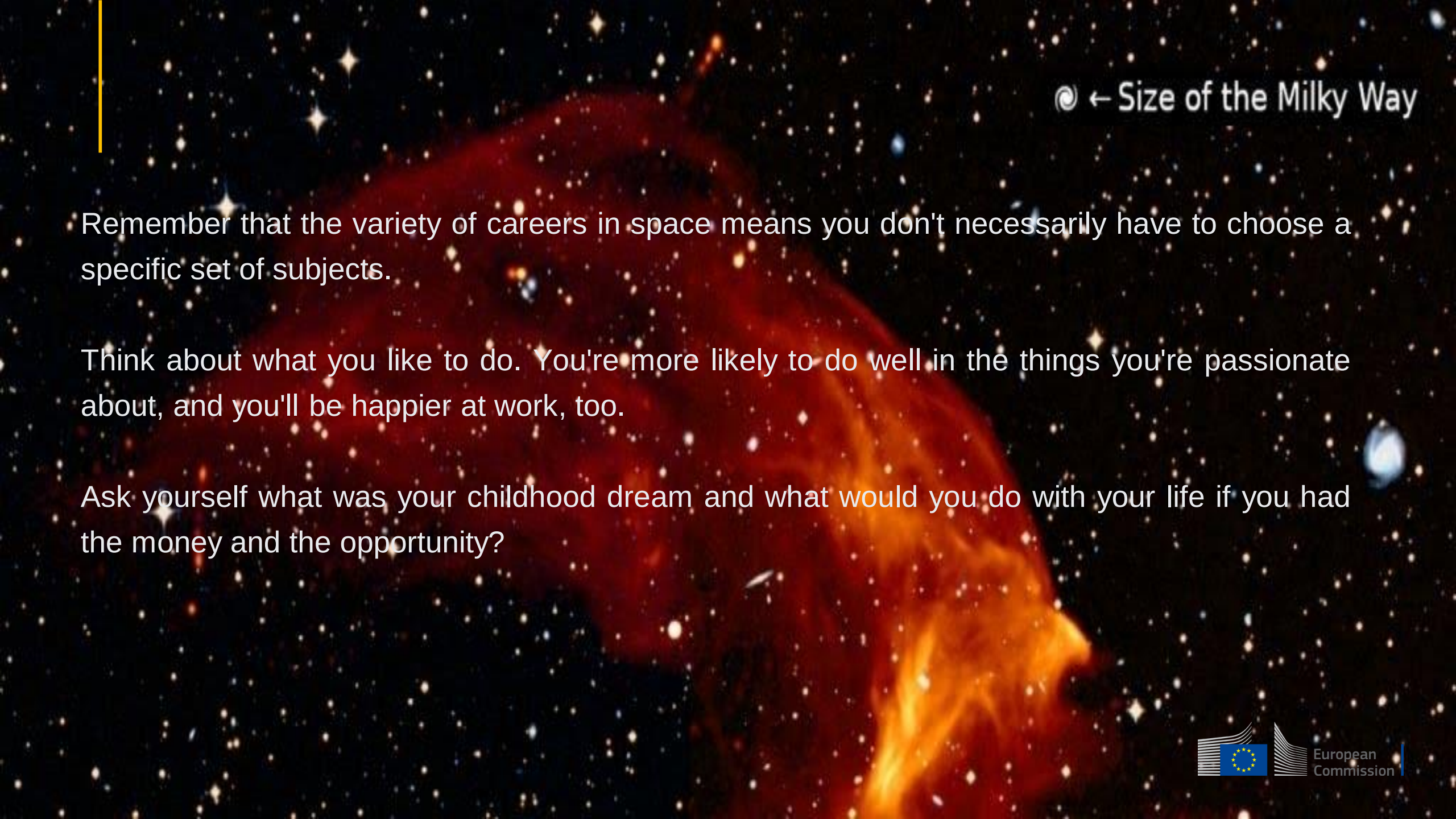
In conclusion..

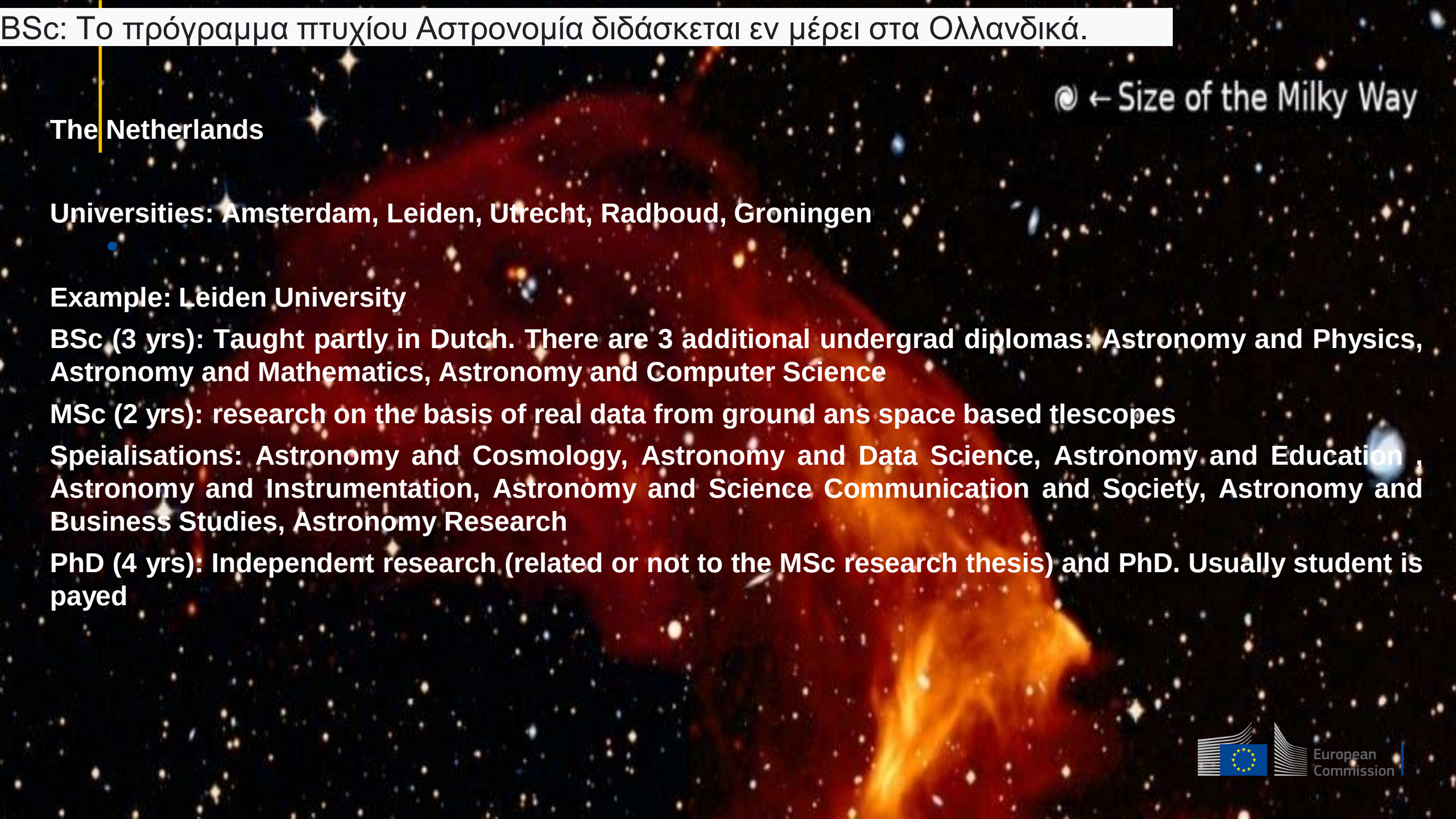


Remember that the variety of careers in space means you don't necessarily have to choose a specific set of subjects.

Think about what you like to do. You're more likely to do well in the things you're passionate about, and you'll be happier at work, too.

Ask yourself what was your childhood dream and what would you do with your life if you had the money and the opportunity?

BSc: Το πρόγραμμα πτυχίου Αστρονομία διδάσκεται εν μέρει στα Ολλανδικά.



The Netherlands

Universities: Amsterdam, Leiden, Utrecht, Radboud, Groningen

Example: Leiden University

BSc (3 yrs): Taught partly in Dutch. There are 3 additional undergrad diplomas: Astronomy and Physics, Astronomy and Mathematics, Astronomy and Computer Science

MSc (2 yrs): research on the basis of real data from ground ans space based tlescopes

Speialisations: Astronomy and Cosmology, Astronomy and Data Science, Astronomy and Education , Astronomy and Instrumentation, Astronomy and Science Communication and Society, Astronomy and Business Studies, Astronomy Research

PhD (4 yrs): Independent research (related or not to the MSc research thesis) and PhD. Usually student is payed

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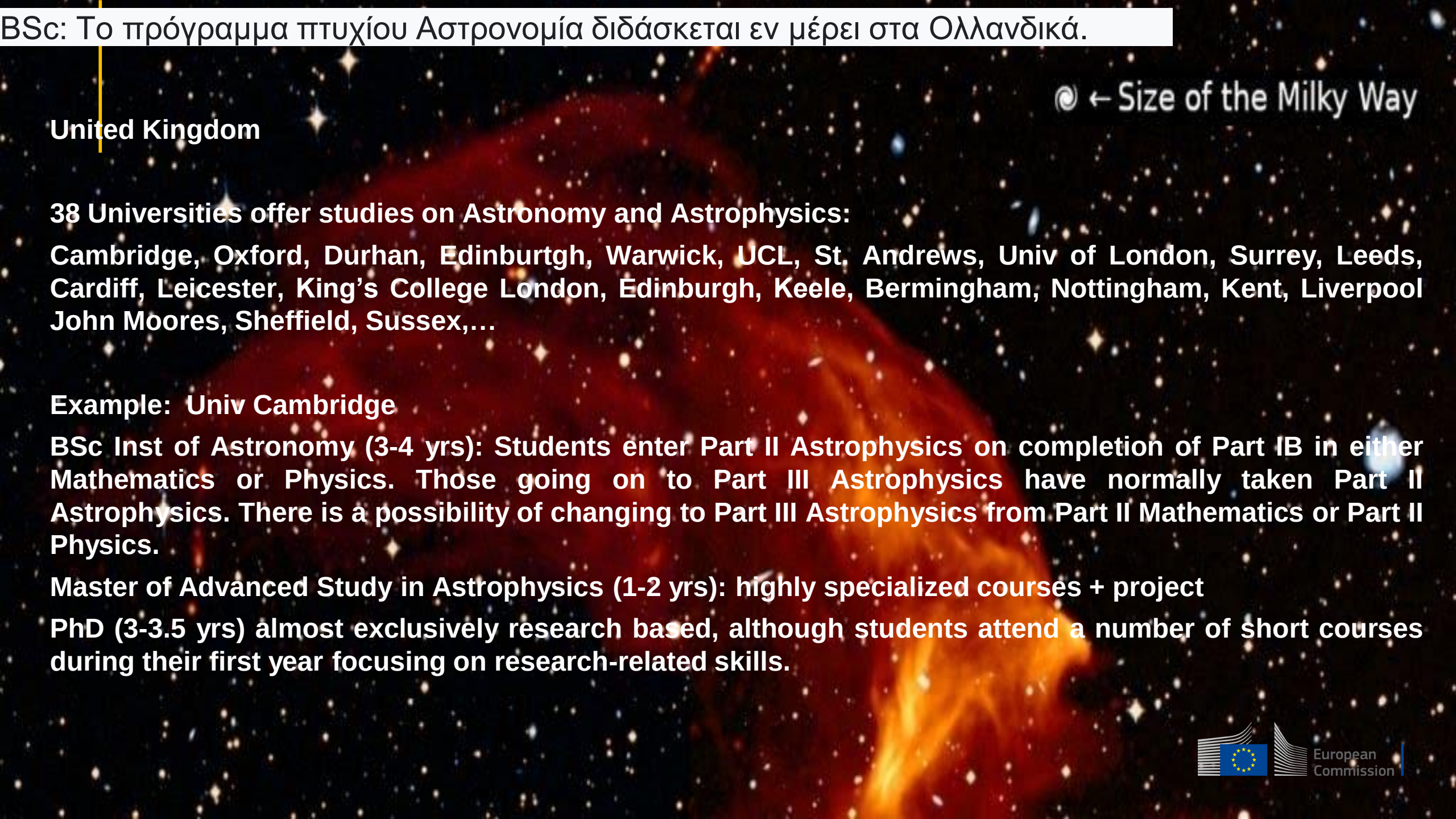

United Kingdom

38 Universities offer studies on Astronomy and Astrophysics:

Cambridge, Oxford, Durhan, Edinburtgh, Warwick, UCL, St. Andrews, Univ of London, Surrey, Leeds, Cardiff, Leicester, King's College London, Edinburgh, Keele, Bermingham, Nottingham, Kent, Liverpool John Moores, Sheffield, Sussex,…

Example: Univ Cambridge

BSc Inst of Astronomy (3-4 yrs): Students enter Part II Astrophysics on completion of Part IB in either Mathematics or Physics. Those going on to Part III Astrophysics have normally taken Part II Astrophysics. There is a possibility of changing to Part III Astrophysics from Part II Mathematics or Part II Physics.

Master of Advanced Study in Astrophysics (1-2 yrs): highly specialized courses + project

PhD (3-3.5 yrs) almost exclusively research based, although students attend a number of short courses during their first year focusing on research-related skills.

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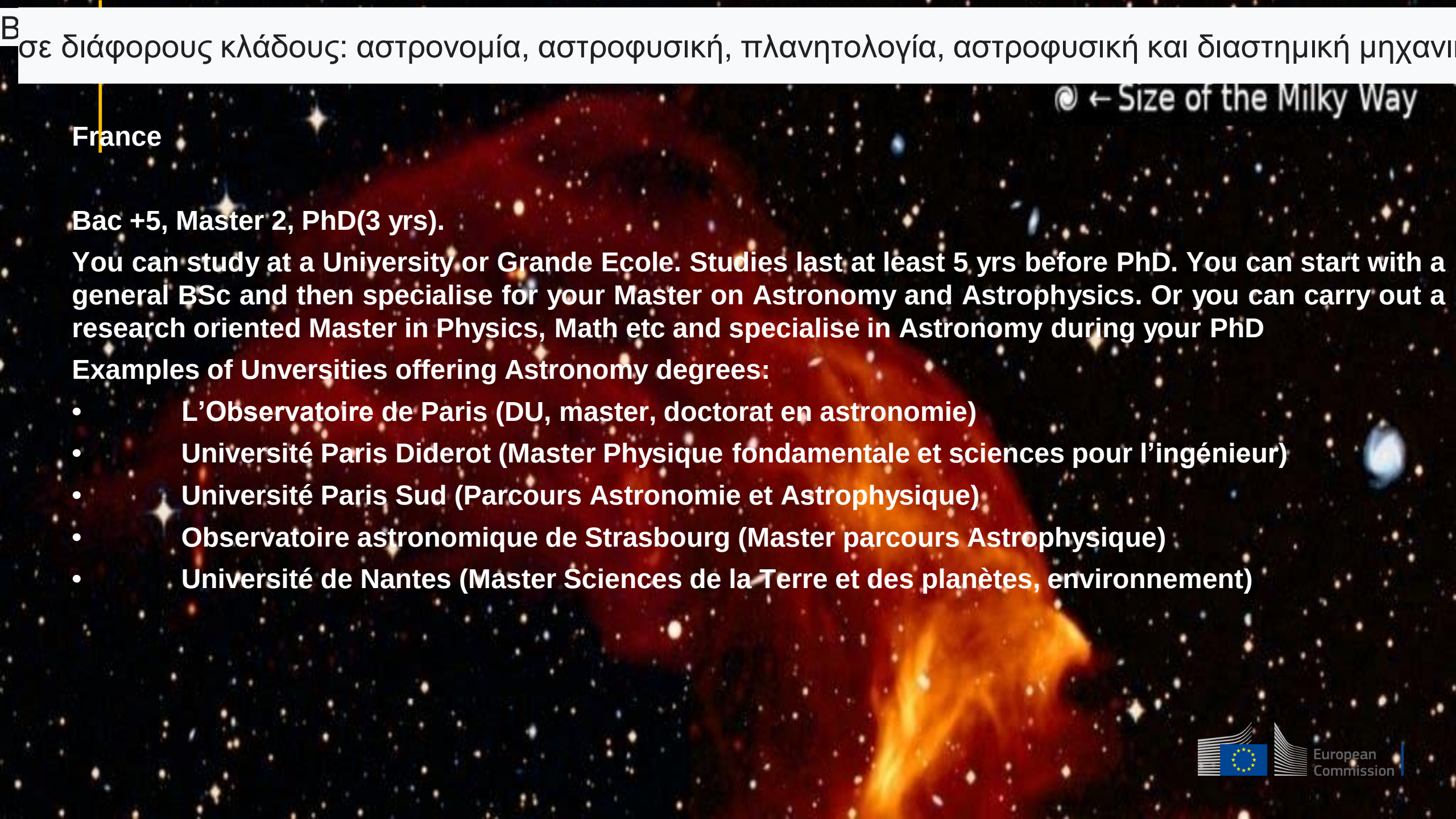
Β σε διάφορους κλάδους: αστρονομία, αστροφυσική, πλανητολογία, αστροφυσική και διαστημική μηχανι



France

Bac +5, Master 2, PhD(3 yrs).

You can study at a University or Grande Ecole. Studies last at least 5 yrs before PhD. You can start with a general BSc and then specialise for your Master on Astronomy and Astrophysics. Or you can carry out a research oriented Master in Physics, Math etc and specialise in Astronomy during your PhD

Examples of Unversities offering Astronomy degrees:

- **L'Observatoire de Paris (DU, master, doctorat en astronomie)**
- **Université Paris Diderot (Master Physique fondamentale et sciences pour l'ingénieur)**
- **Université Paris Sud (Parcours Astronomie et Astrophysique)**
- **Observatoire astronomique de Strasbourg (Master parcours Astrophysique)**
- **Université de Nantes (Master Sciences de la Terre et des planètes, environnement)**

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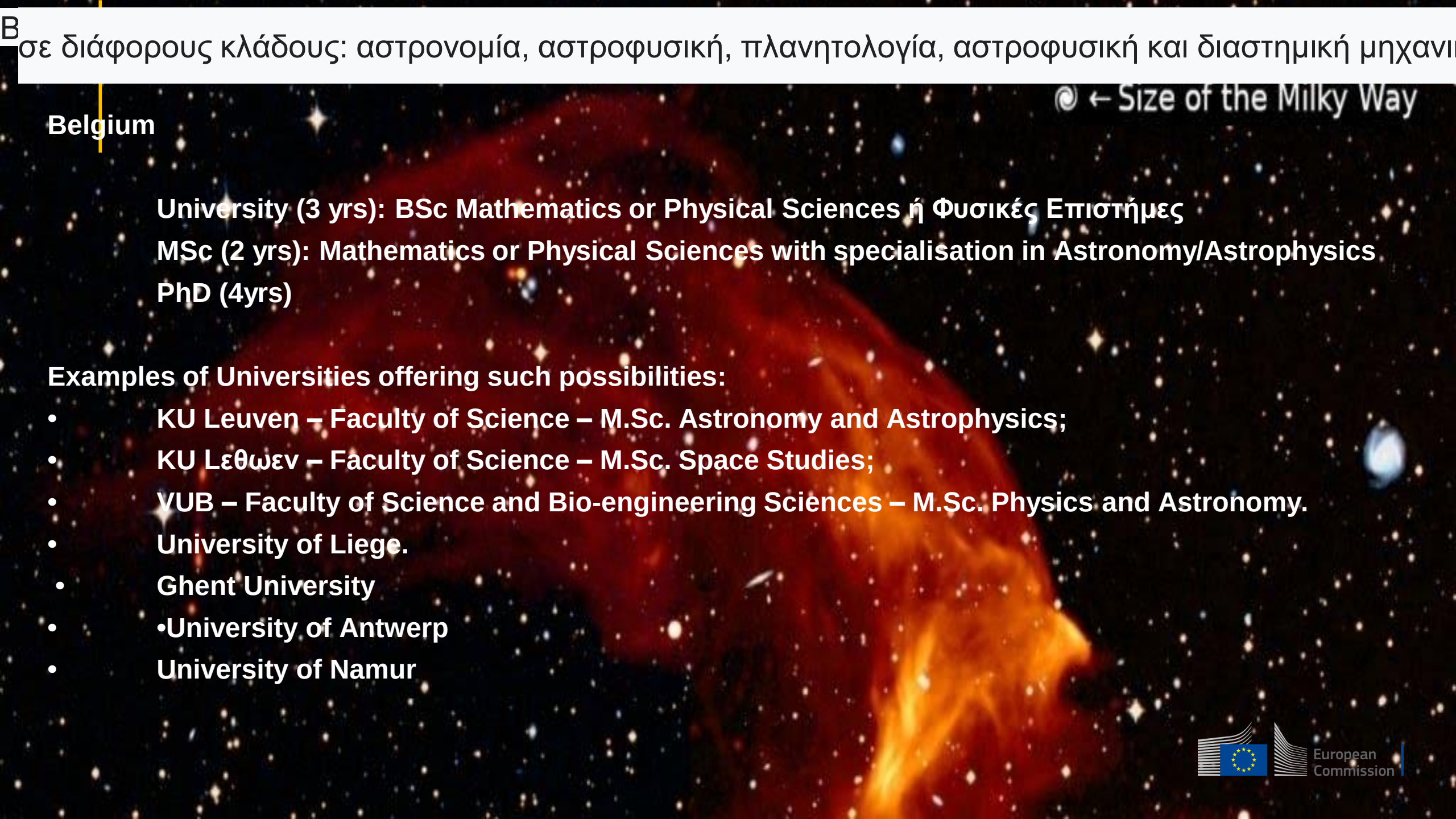

Belgium

University (3 yrs): BSc Mathematics or Physical Sciences ή Φυσικές Επιστήμες
MSc (2 yrs): Mathematics or Physical Sciences with specialisation in Astronomy/Astrophysics
PhD (4yrs)

Examples of Universities offering such possibilities:

- **KU Leuven – Faculty of Science – M.Sc. Astronomy and Astrophysics;**
- **KU Lεθωεν – Faculty of Science – M.Sc. Space Studies;**
- **VUB – Faculty of Science and Bio-engineering Sciences – M.Sc. Physics and Astronomy.**
- **University of Liege.**
- **Ghent University**
- **•University of Antwerp**
- **University of Namur**

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Thank you!

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