

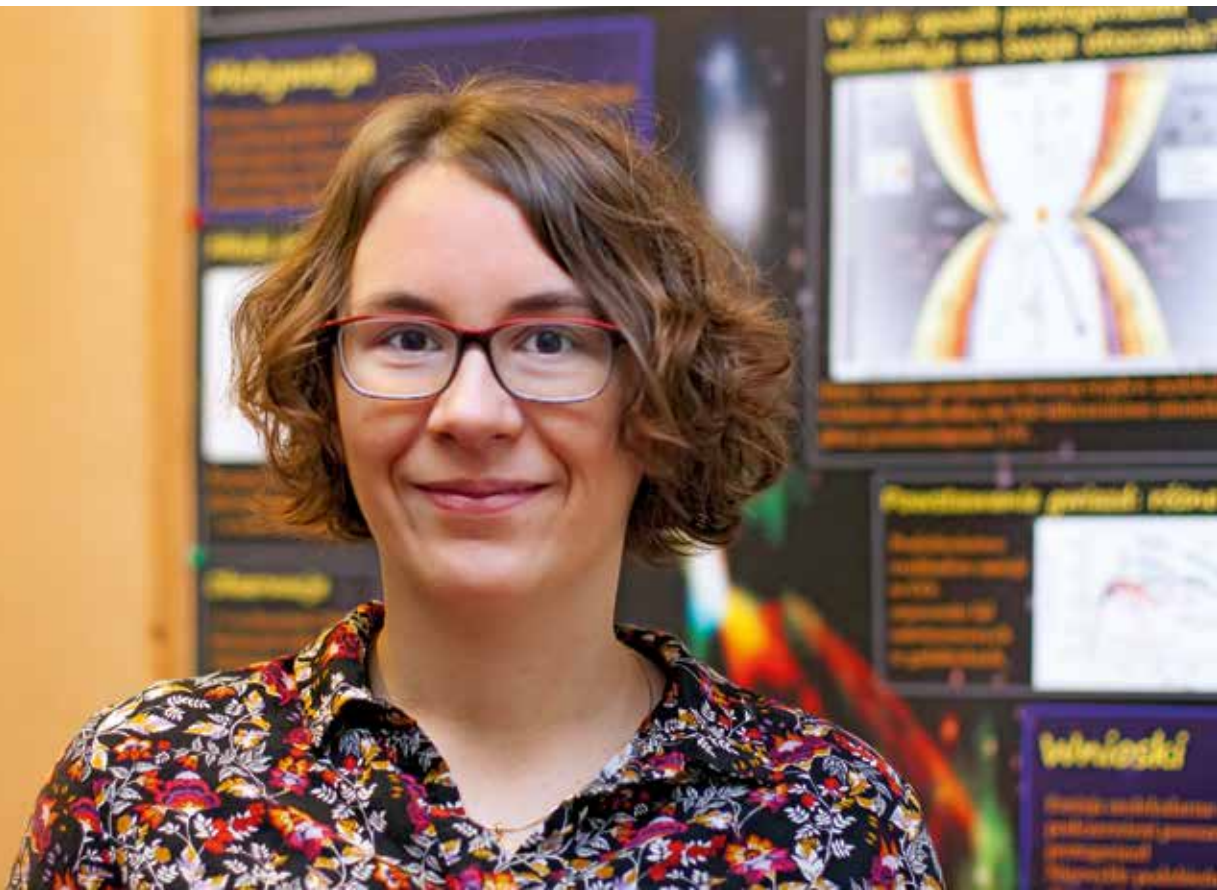
Dr. Agata Karska

astrophysicist and an Assistant Professor at the Centre for Astronomy of the Nicolaus Copernicus University in Toruń. In 2009–2014 she was a doctoral student at the Max Planck Institute for Extraterrestrial Physics in Germany, and received her PhD from Leiden University in the Netherlands. She studies the physics and chemistry of star-forming regions using ESO and ESA telescopes. In 2012 she received the Women in Science scholarship, funded by the German subsidiary of L'Oréal, and in 2015 she was the recipient of the weekly Polityka's Scientific Award in the area of science.

Dr. Karska manages research grants funded by Poland's National Science Centre (NCN).

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MACIEJ MIECZYŃSKI/ŻYCIE UNIWERSYTECKIE 2015



BACK HOME, WITH GOOD PROSPECTS

Dr. Agata Karska of the Nicolaus Copernicus University in Toruń talks about the valuable time we get from ESO, visiting Chile without leaving home, and the opportunities for young scientists in Poland.

ACADEMIA: It has been two years now since Poland joined the European Southern Observatory (ESO).

AGATA KARSKA: And as time goes on the benefits will be more obvious and plentiful. First of all, the

access to data from the world's best telescopes is crucial. It can be obtained by submitting an observation proposal, which goes through a full verification process, both scientific and technical. In the first competition for observing time, in which Poles were already

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treated as members of ESO, we were twice as good as the scientists from most other countries. This proves that Polish astronomers are indeed ready to use these telescopes. Besides, ESO is already trying to attract researchers. They are offering us short-term internships for graduate students, an opportunity to apply for a full 3-year PhD scholarship, as well as the prestigious post-doc scholarships, recently also in technology (R&D), which are available in either Germany or Chile. We are also being included in existing research projects. For example, Prof. Ewa Łokas of CAMK is on a committee defining scientific objectives and supervising the preparation of the E-ELT, the 40m-class optical telescope, while Prof. Andrzej Niedzielski of NCU is involved in developing the HIRES device, which will be installed on this huge telescope. In addition, there are contracts for companies (such as the computer contract for COMARCH), because ESO is involved in building telescopes and devices as well. So we can already see the economic benefits, and there's hope that Poles will take part in the more advanced technology projects.

Before joining ESO Poland didn't have such opportunities. But did we work with ESO in any capacity prior to becoming a member?

Of course, but only as one of many members of the teams using the data, not as team leaders.

From your point of view, was it a long wait to join this organization?

I'm a young person who recently finished her PhD, so my point of view may be somewhat different. Our efforts to join the ESO began soon after 1989, so from the point of view of my older colleagues it did take a lot of time. But the process was fairly quick in recent years. It wasn't until 2011 that we started to talk about it in serious terms, and getting through all the formalities in a span of four years was extremely fast. Austria needed a lot more time. Thus ESO regards us as a very driven community. In fact, ESO supported our membership from the very beginning, as Polish astronomers are world-renowned.

So, in a nutshell, ESO opens up great opportunities for us.

Yes, but it is also a challenge. In order to obtain data using these telescopes we must submit a proposal, which means entering a competition with representatives of countries that have been using these telescopes for a long time, and this is not an easy contest. A support system would come in handy here.

What sort of support system?

In my case it would be helpful to be employed at the university with reduced teaching hours. Writing observation reports, keeping current on various research

findings, and writing timely publication require a lot of concentration and plenty of time. In my opinion, a required teaching load of up to 210 hours a year is excessive. Another way is to combine observing time with funding. I'm talking about the American system that is used for all space missions: if someone is granted observing time on a space telescope, this is tied to a certain amount of money, which can be used to hire a graduate or post-doctoral student, who then works with these data. It would be great if the NCN council would consider establishing a special grant program for astronomers receiving time on ESO and ESA telescopes.

At the moment, what do you have to do if you need to use the telescope?

There are four ESO observatories, all located in Chile. Twice a year competitions are announced for all instruments, with the exception of the ALMA interferometric network for which there is one annual competition. The chance of success is about 30%, but it depends on the instrument. In the last "giveaway" the most popular instrument was HARPS on the 3.6-m telescope at La Silla Observatory, which is used to search for extrasolar planets using the radial-velocity method. Among the devices used on 8-m VLT telescopes, the biggest demand among observers was for the MUSE instrument, which very efficiently collects optical spectra over large areas of the sky, such as those where new stars are formed. So you can see that getting time on newly installed instruments, and those that are used in the fastest developing areas of astronomy, is most difficult. After submitting the proposal, in which we have to explain how the proposed observations might be able to answer important scientific questions, and why our chosen instrument is unique for this purpose, there is a meeting of the evaluation committee. The ESO invites specialists from different fields of science, which now also includes Poles, to sit on this committee. Once the proposal is accepted, we don't even have to leave home. The observations we ordered are actually performed in Chile by ESO astronomers, who also pre-process the data for us. In the end, everything is posted in the online archive, from where the project manager can download the data. However, if the observations are unusual and actually assisting in performing them is advisable, you can travel to Chile at the expense of ESO, but only, of course, if the country is a member of this organization, like Poland.

What are the ESO membership costs for Poland?

There is an initial fee, and then each member country pays annual membership fees so that observatories can operate. These include very expensive, high-tech equipment and many specialists, but that's not all. ESO is developing very rapidly and continually strives

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to build new instruments to add to existing telescopes, and in addition invest in new, groundbreaking projects, such as the 40-meter telescope, which is already very sophisticated when it comes to planning research activities and industry contracts.

Sometimes you hear comments that the opportunities might be nice, but it costs too much and no one actually needs it.

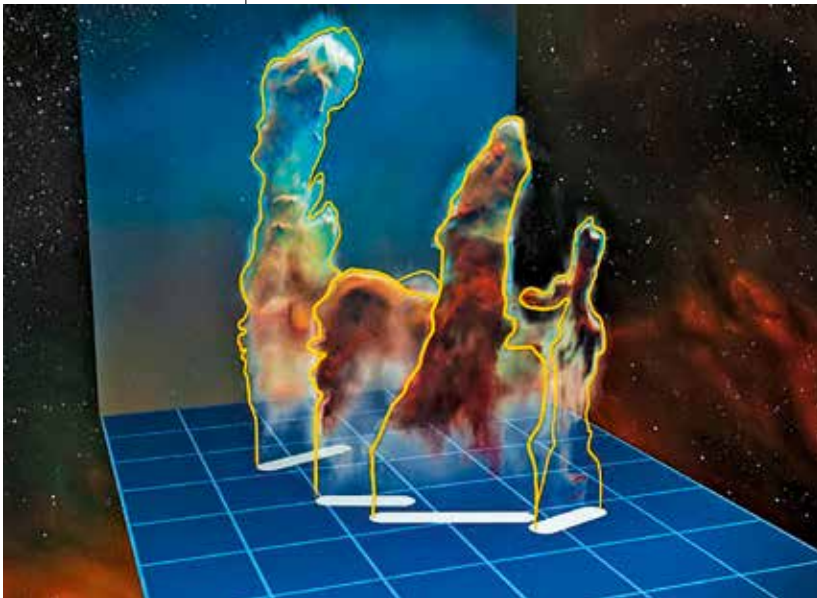
We should ignore this type of talk. Before we started the process to join the ESO, the entire community of Polish astronomers was completely convinced that this is the project in which we want to participate. And here we also have to mention education. Astronomy is

as I recently read, it may be better not to know the answer.

We discover so many planets around other stars, so it's natural to ask whether they have water and life. If it's life, then in what form? Has it already evolved for millions of years, like on our planet, or is it in completely primitive form? And what would happen if we found out? I don't know if anyone knows the answer to this question.

What does membership in the ESO mean for you personally?

Huge opportunities. I can now conduct research here in Poland on the same level as I had before abroad. I have full access to the necessary instruments, and I can be a project manager working on these instruments, which is important for my scientific development and building a reputation abroad. Furthermore, in all competitions, even the most prestigious ERC grants, you have to prove that the applicant has already invented and successfully implemented important scientific projects. I also see great opportunities for my students. ESO employees have repeatedly encouraged my group (and Poles in general) to apply for various positions. This year, my master's student Łukasz Tychoniec received a fantastic ESO doctorate opportunity in Germany (as one of only three students in the world), though he ultimately chose Leiden University. Internship at ESO enables you to work in a very stimulating environment, among very motivated people dealing with various issues in astrophysics, particularly in modern areas, providing opportunity for important discoveries. This is obviously the best place to gain experience in working with data from different telescopes and instruments, which is very useful in research work. I personally think that ESO is the world's best employer in the field of astronomy.



ESO M. KORNWESER

The three-dimensional visualization of the "Pillars of Creation" in the Eagle Nebula, based on MUSE observation on the VLT. The pillars have been shaped by strong radiation and stellar winds from nearby stars, and in about 3 million years they will most likely evaporate completely.

an atypical area, because it's popular among children and young adults, for whom it is a sort of gateway to interest in other science subjects. Many people started out as astronomy students along with me, and after a few months they realized that it's the physics, mathematics, or computer science part of what we were learning that interested them more. Astronomy with its enchanting world of stars and the cosmos is what ultimately attracts many people to science.

It is not only the enchantment, but also the mystery.

Yes, there is something fundamental in astronomy. People want to know where they came from, what are those stars in the sky, how does a solar or lunar eclipse occur. They want to understand the basic phenomena around us. It's really fantastic.

And to find out whether we are alone in the Universe? This is the age-old question for which,

You're a great example of a researcher who returned to Poland after working abroad.

Recently it's been said that Polish scientists should of course be mobile, but ultimately they should want to base their careers in Poland. How do you compare working here after living in other places?

That definitely depends on where you end up. At the various institutes of the Polish Academy of Sciences, 100% of one's time is devoted to research, so, for example, if I had ended up at the Nicolaus Copernicus Astronomical Center or at the PAS Space Research Center, in some respects I would function the same as at the Max Planck Institute, meaning I would not have teaching duties. At universities, however, you have contact with students, which I myself appreciate, because I really enjoy working with young people. It is fantastic, but very time consuming.

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In my first year of work I was given three courses to teach, which I basically had to prepare from scratch and which took up most of my time, causing my research work to be put on hold. I think that making this teaching load a bit more realistic, and providing assistance to those returning from abroad in the form of a teaching assistant, for example, or giving them the opportunity to hire a doctoral student or someone for a post-graduate internship, would help greatly. But on the other hand, at the moment there are fantastic grant opportunities available in Poland, so over time if you needed to hire someone you can do so, or you can even “buy yourself out” of teaching. Basically, I can say that returning to Poland is possible and can be a source of much joy. In my case, I appreciate the fact that I can do more for my students, send them abroad and hope that someday they will return to me, and that together we will do even greater things. But there is also a more prosaic matter: in Poland it is much easier to get a steady job at a young age. At the age of 30 I already got my chance to build my team, while my colleagues from abroad usually start at 40.

This is indeed a big difference.

In the west, a doctorate is not enough. Usually, a minimum of two or three post-docs are needed before you land a permanent job. Ultimately, the job comes with fewer teaching responsibilities, and even includes support for hiring a doctorate student or postdoc, but it does occur much later. In this respect I really appreciate the fact that in Poland you can start to build your own career at such a young age.

Is it due to the system, or is there less competition in Poland?

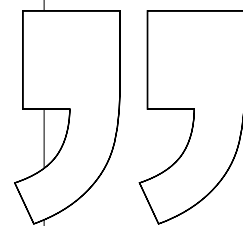
Much less. People from all over the world try to get into highly reputable institutions, such as Cambridge. Unfortunately, although our institutes are good, the world doesn't yet view Poland as a potential workplace. However, thanks to very financially attractive postdoctoral internships offered by NCN (such as part of the POLONEZ program), more and more people are coming to Poland from abroad for a few years. They are often very happy here and end up staying. The second issue is a remnant of our past, meaning our employment system that is in force here. Postdoc internships are a relatively new invention here and are not yet required by most institutes. Meanwhile, it's an admirable practice in the West for researchers who relatively recently earned their doctorate to work at another institute for some period of time, not necessarily abroad, in order to establish new contacts and get inspired by new topics.

From time to time the idea resurfaces for collaboration between universities and PAS institutes in the form of a mutual exchange

of employees. Would that make sense in your opinion?

I think this would be a fantastic solution and, in fact, its effectiveness has already been proven (mathematicians have had great success with it, for example). On the one hand, young scientists often have many ideas for research projects, and many unfinished projects from their doctorate studies, so the time spent at the PAS institute would be great to focus on research work. Of course, with teaching there are things you can do, but to complete a research project requires concentration. It can't be two hours here, two hours there. You need to have quiet, undisturbed time. On the other hand, the opportunity to work at the university and work with undergraduate or graduate stu-

It's an admirable practice in the West for doctorate holders to work at another institute for a period of time, not necessarily abroad, to establish new contacts.



dents is also very rewarding. After completing their doctorate a person usually has a lot of energy to attend conferences and research internships, to collaborate with other centers and promote their students.

So a year here, and a year there?

A year is not enough to undertake an elaborate project, but two or three years makes a lot more sense.

In closing, what can we wish you for the future?

As any other scientist, wish me lots of interesting discoveries! And in addition, a successful launch of the new infrared telescope – the James Webb Space Telescope, which is planned by NASA for next year. I just joined a group from the US, which is preparing a very interesting observation proposal concerning the observation of young stars, and I am confident that these data will contain many surprises. In the meantime, I am trying to organize a group of people interested in astrochemistry, and I hope that in the near future we will be able to carry out interdisciplinary projects together with experimental physicists and quantum chemists, who are able to measure and calculate important quantities related to molecules, which are very relevant to astronomers.

INTERVIEW BY KATARZYNA CZARNECKA