Fellows at ESO

Sergio Martin

I was born in Madrid, where the flag of the region consists of a plain crimson red background containing seven white stars representing the stars in the constellation of Ursa Minor (the Little Dipper). Even the flag of the city of Madrid shows the city's coat of arms where the seven stars of the constellation of Ursa Major (the Big Dipper) are depicted. Beautiful as it may seem, it may now be difficult to find someone who remembers the last time these stars could be clearly seen from the city, due to the light pollution related to modern living. It is thus difficult to understand how I chose to become an astronomer from such a star-deprived city! Actually I cannot remember the time when I took such a decision. At some point during high school I became intrigued by physics, and once I got to university I just knew that astronomy was the only way ahead for me. Perhaps my spending most of my childhood summers in a small town in one of the darkest spots in Spain, with an overwhelmingly star-crowded night sky, had something to do with my decision.

So there I was on my way to an astronomy career. After my degree in physics, I spent one year at the Observatorio Astronómico Nacional, where I first got in touch with the experience of real research. It was during this time that I observed with a professional telescope for the first time. That was the 30-metre radio telescope located at an altitude of almost 3000 metres on top of the Sierra Nevada, near Granada in southern Spain. This telescope was, and still is, the most powerful single dish telescope operating at millimetre wavelengths, and I was there using it for my own research project! I clearly remember the first time that I was allowed to access the computer controlling the telescope and how I ran outside the building to see how that massive antenna started to move under my first observing command. I was observing, and I loved it!

I was then given the opportunity to move to Granada, one of the most beautiful cities in the south of Spain, to start my PhD at the Instituto de Radioastronomía Milimétrica (IRAM), an international research institute for radio astronomy that maintains the 30-metre telescope in Spain and the Plateau de Bure interferometer in the French Alps. I spent four years in Granada where, apart from carrying out my PhD research, I had to spend about a week per month as astronomer on duty at the observatory. There I helped visiting astronomers with their observations which allowed me to meet lots of people coming from institutes around the world and with a wide variety of science interests. Even though tiring at times, doing my PhD at an observatory was a great experience. On top of a great observing experience, I could also enjoy gorgeous mountain sunsets.

The main topic of my PhD was the study of the detailed chemical composition of the interstellar medium in the central region of galaxies. My aim was to understand whether the physical processes in these regions can be traced by measuring the abundances of different molecules. There are currently more than 50 molecules detected outside our Galaxy. If we manage to understand the origin of these molecules we can decipher valuable information about the regions where they formed.

My PhD years were over and it was time to move on. A couple of weeks after I defended my thesis I moved to the Harvard-Smithsonian Center for Astrophysics (CfA) in Cambridge (Massachusetts, USA), close to the lively city of Boston. The scientific life at the CfA, one of the biggest astronomy hot-spots in the world, was a whole new story compared with my previous experience. Hundreds of astronomers working on every field of astronomy resulted in dozens of science talks every week. Within the CfA, I joined the Sub-Millimeter Array (SMA) as a fellow. The SMA was the first interferometer operating at submillimetre wavelengths. The SMA interferometer combines the signal from eight 6-metre antennas to achieve high resolution astronomical images. Though located at an altitude of 4000 metres on top of Mauna Kea in Hawaii, we remotely controlled the array from Cambridge for the second half of the nightly observations.

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Luckily, I had the opportunity of helping with the observations on site a few times a year. I have always felt the need to work close to the instrumentation and see this as key to keeping up with the daily operations. On top of that, I always tried to compensate a few days of intense night observation at high altitude with some time off in the amazing Hawaiian islands. During this time I extended my molecular studies to the very central region of our own Galaxy, where I studied how the molecular gas is affected by the harsh conditions around the central supermassive black hole. Even taking into account the extreme weather conditions of the US east coast, the time in Cambridge was scientifically and personally enriching.

But again, as part of this migrating job it was time to move on and I received the offer to work at ESO in Santiago, where I joined as an ALMA fellow. This was the opportunity to take part in the commissioning of the largest astronomy project ever undertaken on earth, the Atacama Large Millimeter/Submillimeter Array. At an altitude of 5000 metres in the middle of the Atacama desert, one of the driest

places in the world, hundreds of people are working hard to put together 64 large antennas working together as a unique and overwhelming instrument. Once ALMA is in operation, starting at the end of this year, we will be able to get a glimpse of the most distant galaxies formed in the early times of the Universe down to the planets forming around nearby stars. Being here in Chile during these exciting times, when ALMA is starting to peer into the Universe, is an extremely rewarding experience. We are indeed on the verge of the next revolution in astronomy and, as part of a worldwide astronomical community, I am keen to see what this amazing instrument will teach us about the origin of the Universe and the emergence of life.

It is actually difficult to figure out what will be the next step in my astronomy career: what one has to make sure is to enjoy every single step of the way.

Joana Ascenso

"Gastronomy, how very interesting!"
"I agree, but I am actually an astronomer."

It turns out that the idea of an astronomer evokes all sort of images, including those of the wacky astrologer, of the weatherperson, or even of a chef for the more distracted, and it takes some explaining to convince people that an astronomer is just "a scientist". Describing what a scientist actually does, that takes another session altogether. In my case it's relatively easy: I study how stars form.

It's hard to identify a single event that led me to astronomy. Having grown up in Coimbra, Portugal where the sky was dark but not particularly spectacular, I cannot say it was the view from my window that decided my career. Maybe the rich tales of the stars from my grandparent's village first made me realise that the Universe was not just stickers in the night sky, and I'm pretty sure that the big, heavy encyclopedia of the Universe in the living room had something to do with it too, since it was already missing a piece of the spine from being opened too many times when I was still a teenager. The affinity for science must have done the rest, because when time came to choose a university degree, astronomy already sounded like the most interesting option. I did my undergraduate studies in mathematics, physics and astronomy at the University of Porto, during which time I also guided tours of the local planetarium, a very fulfilling experience that taught me the importance of communicating science. It's remarkable how amazed people can be about even the simplest things in the Universe, especially the adults. Small children find it all normal, probably like learning that there are other cities besides their own, and I am sure I was more amazed by their replies than they were by my astronomical facts.

I continued in Porto for my Master's thesis on the spectral properties of young T Tauri stars, after which I started my PhD. I had two thesis supervisors, who inspired me greatly: Teresa Lago in Porto, and João Alves, first at ESO in Garching, and then Granada, which meant I spent my time between these three cities. The experience of living abroad and working in different institutes (Centro de Astrofísica da Universidade do Porto [CAUP], ESO and Instituto de Astrofísica de Andalucía [IAA]), all of which have excellent conditions but somewhat different work cultures, widened my perspective of science and impressed me beyond expectation.

My PhD thesis was about young massive star clusters still embedded in their natal clouds. I went about it from the observational perspective, which provided me with one of the best experiences I've ever had: to observe with a "real" telescope. To see the near-infrared images of my first cluster taken at ESO's La Silla Observatory in Chile with the dark desert as background was exhilarating. Those were images no one had ever seen before, and they were mine for the taking. They proved to be as scientifically relevant as beautiful, and I spent the following four years observing more clusters at the ESO telescopes, and studying their properties, namely mass function and morphology, and whether it was possible to actually detect and measure spatial segregation of stars of different masses in massive clusters.

Joana Ascenso

My first post-doctoral fellowship took me to the Harvard-Smithsonian Center for Astrophysics in Cambridge, to work on Spitzer data of the Pipe Nebula, a nearby dark cloud. I ended up learning more about linear regression than I had ever intended, in a successful attempt to prove that the extinction law toward high-density cores was different from that of the low-density interstellar medium due to grain growth. This project, as well as the analysis of more data on some of the clusters I had studied in my PhD, was prolonged through my next postdoctoral position, back in Porto.

I am now back at ESO, eleven months into my fellowship, and enjoying every bit of it. Apart from doing science, I also work on the E-ELT (European Extremely Large Telescope) project assessing science goals, conditions for the use of different instruments, and whatever is necessary to help get the telescope going. The contact with other fellows, the varied and plentiful seminars and talks, and the proximity to the core of the observatory makes ESO a unique place for a post-doc.