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Fellows at ESO

Marianne Heida

The most amazing thing about observing is, I find, the silence. Daytime is of course very different, but at night, when there's nothing to be heard except the wind and the movements of the telescope, it always feels a bit magical.

I didn't always want to be an astronomer. I didn't have a telescope as a child (and there wouldn't have been many stars visible anyway from our backyard in the western part of the Netherlands, one of the most densely packed pieces of land in Europe). I was always interested in science in general and wanted to be a doctor for a while, but I ended up studying physics because I liked the people and the fact that they had a particle accelerator in the basement. In the course of my BSc I abandoned my initial plan to focus on theoretical physics because it turned out to be a bit too theoretical for my liking, and I instead turned to astronomy. I very much enjoyed the courses but got absolutely hooked when I got to go to La Palma to observe on the William Herschel Telescope in the course of my BSc thesis work. I would return there many times during my MSc and PhD.

After finishing my BSc and MSc in astrophysics at Utrecht University (which sadly shut down the 370 year old astronomy department shortly afterwards) I continued as a PhD student at SRON, the Netherlands Institute for Space Research which at the time was also based in Utrecht, and the Radboud University Nijmegen. My thesis, under the supervision of Peter Jonker and Gijs Nelemans, was focused on near-infrared observations of ultraluminous X-ray sources (ULXs). These are pretty rare (~ 1 per Milky Way-sized galaxy), very luminous X-ray sources that are found outside galactic nuclei. They are not supermassive black holes, but exceed the Eddington limit of a normal stellar-mass black hole. When they were first discovered they were generally thought to be strong candidates for hosting intermediate-mass black holes (IMBHs). At the time I started my PhD, a consensus was forming that most of them were probably super-Eddington stellar-mass black holes instead, although some might still contain IMBHs. The only way to prove that is through dynamical mass measurements of their donor stars, but these were very difficult to detect in the optical because all ULXs are extragalactic and because their accretion discs can hide the donor star emission. So we decided to look for red supergiant donors in the near-infrared, where the accretion discs are not as dominant. We managed to find several, but as the expected orbital periods for such systems are on the order of years, we're still observing them to look for radial velocity changes. In the meantime, X-ray pulsations have been detected from several ULXs, showing that the accretors in those systems are not black holes at all but neutron stars! So now, instead of hoping to find IMBHs, the question has become whether any ULXs actually contain black holes at all.

Marianne Heida

After finishing my PhD I moved to Caltech where I spent almost four years as a postdoc in the NuSTAR group of Fiona Harrison. I had a great time there and learned a lot about X-ray observations (and hopefully taught the X-ray astronomers a bit about optical/infrared observing). During my time in California I got to observe quite often at Palomar and Keck. Palomar observatory in particular is an amazing place, with such a rich history. One of my best memories is the special deluxe tour I got from the observing assistants on a particularly cloudy night, when we got to climb into the support structure of the Hale telescope and peek out of one of the holes in the "horseshoe", ten metres above the floor.

In October 2019 I returned to Europe to start an ESO fellowship in Garching. I'm still observing ULXs, trying to figure out where these enigmatic sources fit in our picture of massive binary star evolution. For my functional duties I'm assisting Harald Kuntschner in the final development stage and (hopefully) commissioning of the Enhanced Resolution Imager and Spectrograph (ERIS). I've used data from ESO telescopes throughout my career, and seeing up close how the observatory works and how new instruments are developed has been an amazing experience. The wide variety of interests and expertise of the scientific community at ESO make for a great atmosphere. Of course the pandemic has made the last year and a half, well, very interesting. I'm very much looking forward to returning to normal, whatever that will look like, and hope to visit Paranal before the end of my fellowship to see ERIS in action!

Peter Scicluna

I was introduced to science fiction as a young child, and the fantastical stories and vistas quickly captured my imagination. This grew into an interest in all things related to space, and I set to devouring books about everything from space exploration to the lives and deaths of

stars and the birth of the Universe. Around the same time, two events occurred in relatively quick succession which made astronomy big news in the UK: the impact of comet Shoemaker-Levy 9 on Jupiter and the appearance of comet Hale-Bopp.

Before too long I had set my sights on becoming an astronaut, like many other children. I soon realised that, alas, this was not to be, so I was drawn to the next best thing: astronomy, although I didn't entirely realise this was the destination at the end. Growing up in Cambridge, I proceeded to drag my parents along to visit the Royal Observatory (now sadly closed) and any other observatory within reach, soaking up the scientific history of the town at every opportunity.

As I approached the end of secondary school, I knew I was going to study one of the sciences. In spite of my less-than-stellar mathematical ability and clear ease with chemistry, I opted to pursue physics at Manchester — perhaps my childhood self refusing to be turned from the path it had set out on. I struggled, partly because I was not prepared for study that required genuine effort, and partly because my mental health suffered in the first few years. As a result, I only ever managed to do just well enough to continue. Fortunately, I made it to the 4th year, where I got to do a research project tangentially related to radio astronomy, and I flourished. Immediately, I knew that research was the thing for me, and set about looking for opportunities to continue in astronomy.

This occurred at the worst possible time — as I was looking for a PhD, funding for research in the UK was facing an unprecedented squeeze. Funding for new PhDs was cut by 50% in one year, without warning. Unable to find a position, I took the only route I could see to extend my stay, doing a second Masters' degree in astrophysics at UCL. One year later, I had some new skills and had enjoyed another year of research, but the funding situation in the UK was no better.

As a result, I cast a wide net for opportunities, and was lucky enough to find a collaborative project between ESO and Kiel University in Germany. This meant

Peter Scicluna

moving to a new country, but turned out to be one of the best decisions I ever made. I learned a new language (well, a bit of it at least), experienced a vibrant research environment and made friends from a wide range of cultures. At the same time I learned the joys of studying dust, which is oddly satisfying because it seems so insignificant in the vastness of the Universe, yet is involved in so many important processes and is everywhere we look. As much as half the light we observe from the distant universe may have interacted with dust on its way to get here!

Initially, my thesis was supposed to be about star formation and developing software for dust radiative-transfer modelling (simulating how light interacts with dust before it is observed at a telescope). Part-way through my PhD I shifted my focus (not entirely endorsed by my supervisor!) from studying the births of stars to their deaths, and have retained a somewhat eclectic approach ever since. This led me to a postdoc in Taiwan where I worked in a fantastic research group under Francisca Kemper, where people studied any aspect of astrophysical dust they found interesting, from debris discs around nearby stars to the most distant galaxies. This suited my eclectic tendencies, giving me a chance to branch out and try other things while continuing to focus my main efforts on dusty evolved stars. These are particularly interesting since they are in the process of ejecting their outer layers — enriched with the products of nuclear fusion — into interstellar space, where they may eventually become the building blocks of life.

After spending four years in beautiful Taiwan, I got the chance to return to ESO as a fellow, but this time on the "other side" — in Chile. I had previous experience working with observations across a wide wavelength range, but little to none with interferometry. Nevertheless, for my duties I support observations with the VLT Interferometer and haven't stopped learning new things about it since I arrived. Finally getting to travel to Paranal and see the VLT was awe inspiring, from the desolate scenery to the marvels of engineering that are the telescopes. Nevertheless, the real wonder is the sky; I am always forced to stop and stare for at least a few moments at night, reminding myself of why I do this as I try to drag my attention back to the task at hand.