Fellows at ESO

Ruud Visser

Ruud Visser

Growing up in the densely populated Netherlands, with all of its light pollution and cloudy weather, I never had much of a clear view of the night sky as a kid. Perhaps that explains why I was never all that interested in astronomy in high school. I developed a liking for chemistry instead, and that is what I ended up studying at the Vrije Universiteit in Amsterdam.

A few years later, towards the end of my Bachelors programme, I attended a one-day symposium for chemistry students. One of the talks was on the topic of astrochemistry, where I learned that the Universe was filled with a lot more interesting stuff than stars, planets and the occasional black hole. There were molecules in space!

Although I was already set to do a Masters degree in theoretical chemistry, the notion of interstellar chemistry held such appeal that I wanted to learn more about it. I contacted the speaker, Ewine van Dishoeck from Leiden University, and she was kind enough to accept me into her group for a half-year research project as part of my Masters programme. I constructed a model of the chemistry of polycyclic aromatic hydrocarbons (PAHs) in circumstellar discs, which was used by a PhD student and a postdoc to analyse PAH observations from the Very Large Telescope (VLT) and the Spitzer Space Telescope.

After completing my Masters in Amsterdam, I returned to Leiden in September 2005 to start a PhD project on chemical evolution during low-mass star formation. My first task was to turn the research report from the PAH project into a paper for *Astronomy & Astrophysics*. During this time I accompanied another PhD student on an observing run with the VLT Imager and Spectrometer for mid-InfraRed (VISIR) on the VLT to gather more spectra of PAHs in discs. I barely had any idea what I was doing, but that just made the trip all the more useful as a hands-on introduction to astronomy. Needless to say, the night sky over Paranal was much more spectacular than anything I had ever seen back home.

The bulk of my PhD thesis work consisted of modelling the physical and chemical evolution of a molecular cloud core as it collapses to form a star and a circumstellar disc. At first I was interested only in the chemistry itself, and the physical model of a collapsing cloud merely formed the canvas onto which to paint my chemical picture. Soon, however, I began to appreciate the astrophysical aspects of this project. No longer did I feel like a chemist lost in space; I had become a proper astrochemist, and felt very much at home in an astronomy department.

Like most chemists and astronomers, I became part of an ever-growing number of international teams. My thesis project required only a small number of collaborators, but I got a taste of working in a bigger team through the “Cores to Disks” Spitzer Legacy Project. Telecons and team meetings became a part of everyday life.

Around the time that I finished my PhD, the Herschel Space Observatory started operations. I stayed in Leiden as a postdoc for one year to join Ewine’s Key Programme on water in protostars, giving me a taste of working in another team of many dozens of people spread all around the world. The first water spectra from Herschel showed booming lines in embedded protostars, but barely anything in circumstellar discs. Ancillary data on rotationally excited CO revealed widespread gas of a few hundred to a few thousand kelvins almost anywhere we looked. Frantically, the whole team got to work and cranked out a dozen letters for the *Astronomy & Astrophysics* special issue. The six months between receiving the first data and submitting the letters were as hectic as they were rewarding.

In early 2011, I moved to the University of Michigan in Ann Arbor (near Detroit) to continue working on the analysis of Herschel data and the development of my chemical models with Ted Bergin. I began to investigate the effects of luminosity outbursts from a young star on the chemical composition of the surrounding gas, eventually teaming up with researchers in Denmark to discover the first chemical evidence of such outbursts with the Atacama Millimeter/submillimeter Array (ALMA). The energy released during an outburst heats up the circumstellar gas and dust and some of that dust becomes too warm to hold on to its icy mantle, thus increasing the column densities of CO and other volatile species. This excess CO showed up as a serendipitous discovery in a collaborator’s ALMA observations. By now we have also seen excess CO in archival data from the Submillimeter Array (SMA), suggesting that luminosity bursts are a common event for embedded protostars.

When I moved to the US, some of my friends joked that I would get married there and never return. I did indeed get married in Ann Arbor, but still returned (to Europe, at least) when my wife and I both started ESO Fellowships in September 2014. The move to ESO provided an excellent opportunity to get hands-on experience with ALMA data. Although my own research continues to focus on computer simulations, I have benefitted greatly from discussions with ALMA experts at ESO on the observational tests and implications of my models.

My functional work, not surprisingly, takes place in ESO's ALMA group. I help with calibrating and imaging of newly taken ALMA data to ensure the observations meet certain quality criteria before delivery to the Principal Investigator. In April 2015, my duties took me to Llano de Chajnantor for two one-week shifts as astronomer on duty at ALMA. Working with this state-of-the-art facility was one of the high points of my career, both literally and figuratively.

People sometimes ask me if I think of myself as a chemist or an astronomer. The only possible answer is that I think of myself as an astrochemist, combining the best of both fields in an effort to unravel our own cosmic history. I may not have seen much of the stars as a kid, but trips to the VLT, ALMA, Mauna Kea and many other places around the world have more than made up for that. As I enter my third year as an ESO Fellow, I look forward to the opportunity to see more of the Universe and to explore the chemistry that takes place within it.

Linda Watson

In high school I enjoyed most of my classes without a strong preference for a particular subject. In retrospect, I see that my science and maths teachers helped me lay the foundations for my astronomy career. I am especially grateful to my Earth and Space Science teacher for devoting a couple weeks to astronomy and inspiring me to ask my first good astronomy question: are there stars between galaxies?

Linda Watson

I went to college at The University of Florida (UF), where I developed more of a science focus. I tried out classes in chemistry, engineering and physics. With the help of more fantastic teachers and mentors, I decided to major in astronomy and physics. The astronomy department at UF helped me test whether I wanted to pursue an astronomy career by allowing me to work with two professors on research projects, sending me to the Kitt Peak National Observatory to learn about observing and encouraging me to spend a summer doing research at another university.

I then went to graduate school at The Ohio State University (OSU). After studying the supermassive black holes at the centres of galaxies for a couple years, I studied the connection between gas and star formation in nearby galaxies for my thesis. I enjoyed working with data from across the electromagnetic spectrum, including optical, infrared, and radio wavelengths. I am not sure when the transition happened (first published paper? graduation?), but my mentors at OSU helped me to become an astronomer.

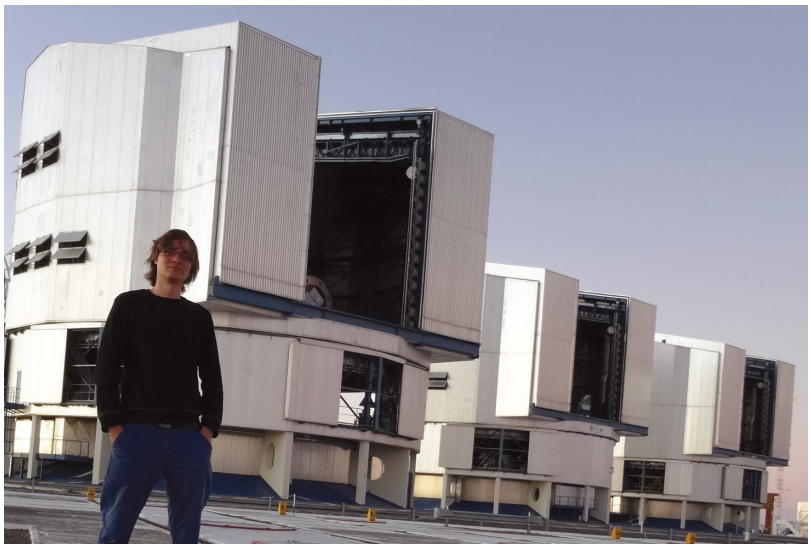
After receiving a PhD, astronomy encourages early-career scientists to work in short-term (2–3 year) postdoc positions, both so that newly-minted PhDs can develop more expertise and independence and because there are relatively few permanent astronomy positions. My first postdoc was at the Harvard-Smithsonian Center for Astrophysics. I worked for the Submillimeter Array (SMA), which I used to study the cold interstellar medium that contains molecules and dust and is the raw material out of which stars form.

I am now lucky to be at ESO in Chile for my second postdoc. I continue to study the cold interstellar medium and star formation in nearby galaxies. For my functional duties, I support the Atacama Large Millimeter/submillimeter Array (ALMA) by observing and processing data. I have especially enjoyed working with the telescope operators, engineers, computing experts, outreach coordinators, and astronomers that make ALMA the world-class facility that it is.

I have followed a relatively standard career path for an astronomer. However, I believe that science is better when the community has diverse backgrounds. So I look forward to continuing to work with curious and motivated individuals who have followed both standard and non-standard paths into astronomy.

Daniel Asmus

It is thanks to my father that I am now in the position to write this article about my career as a scientist. All his life he was very interested in nature and technology, in particular aeroplanes and flying. The conditions and times in which he grew up did not permit him to follow his curiosity and become a scientist himself. However, he made sure that I would have this possibility, and early on he taught me to how to understand, plan and realise things from scratch. One of my earliest memories in my childhood is of him showing me how to build a wall of LEGO bricks, with an interlocking pattern. Such a wall would be strong and would not collapse easily.



Daniel Asmus

In this spirit, I grew up with a big interest in natural sciences and technology in Bad Segeberg, a small (and boring) town in northern Germany. It turned out that I was also good at mathematics, although (even today) I am not very fond of it. As a child, I was interested in planets and space travel but it never occurred to me to use telescopes to look at the heavens, possibly because of the weather in northern Germany, or maybe because in my environment nobody knew about astronomy. It did not help either that during my school years there were too few kids interested in physics for it to be offered as a major subject in either of the high schools in town. Therefore, it was probably rather Star Wars that set the course for my path into science (fiction). While not necessarily the case today, at the age of seven it made a huge impression on me.

With only basic physics (but a major in maths), a short period of uncertainty occurred when it came to choose the career path after high school. A degree in marine engineering seemed to be the more solid choice but I was already an idealist at that time and therefore chose to study physics (at the University of Kiel). While I was struggling to understand quantum physics and thinking about a diploma thesis in dusty plasma physics (which certainly would have led me into industry), something very rare at German universities happened: a new astronomy professor arrived, and with him a new group. And they were working on black holes! Well, on accretion discs around them, but that was exciting enough for me to aim for a diploma with Wolfgang Duschl, the new professor. When I saw the rings of Saturn with my own eyes through a 15 inch telescope during a cold night on the roof top of the institute, all last doubts were extinguished, and the title of my diploma thesis became “The Inner Region of Accretion Disks around Black Holes”, a theoretical work.

Everything changed when I heard from a finishing PhD student in Wolfgang’s group about the possibility of a studentship at ESO in Chile. So I decided to abandon my hydrodynamical relaxation code and get some observing experience under the supervision of Alain Smette. Indeed, the experience started sooner than expected, namely with writing an ESO observing proposal! It had to be written even before starting the ESO studentship, while I was still part of a group of pure theoreticians. However, I was lucky: we were awarded B rank, and almost all the requested observations were executed. These observations of nearby active galactic nuclei (AGN) brought me into contact with the mid-infrared and the VLT Imager and Spectrometer for mid-InfraRed (VISIR) for the first time, the start of a long and continuing relationship, as it would turn out.

The ESO studentship in Chile was certainly one of the best experiences of my life. Not only did I experience Paranal and became an observational astronomer (although I never wanted to give up on simulations actually!), but also personally it was a mind-blowing experience. Therefore, it is probably not surprising that I returned as a Fellow to ESO Chile in 2014, after finishing my PhD on the subject of mid-infrared properties of local AGN at the University of Kiel in 2012, and a joyful two year postdoc at the Max Planck Institute in Bonn in Gerd Weigelt’s group, which led to the longest paper I will ever write (not recommendable).

My ESO fellowship started just in time to join the VISIR recommissioning activities in 2014 as instrument fellow. I enjoyed being part of the team a lot, giving me not only fundamental insights into VISIR and the observatory but also into working in (bigger) groups. When I am not working on VISIR, I am support astronomer at Unit Telescope 3 and I love to astonish visitors with the incredible adaptive optics performance of the Spectro-Polarimetric High-contrast Exoplanet REsearch instrument (SPHERE). Working in Paranal is a great experience, which I strongly recommend to (almost) everyone. I learned so much about all aspects of observational astronomy.

In my “free time”, I continue to research on active galactic nuclei and regularly meet with the fast growing community of AGN friends in Santiago. Furthermore, I am also one of two Fellow representatives in Chile.

For the future, I cannot wait to see the James Webb Space Telescope (JWST) fly and the European Extremely Large Telescope (E-ELT) being built. Both will have excellent mid-infrared instruments that I hope to be able to point into the hearts of our neighbouring galaxies to unveil the eating habits of the supermassive monsters lurking there.