LAURA DRIESSEN

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Education

2017 The University of Manchester; PhD student - Pulsars and transients with MeerKAT

2015-2017 The University of Amsterdam; Master of Astronomy and Astrophysics

2014 The Netherlands Institute for Radio Astronomy Research; International Summer Student Program

2013/14 International Centre for Radio Astronomy Research; Summer Studentship

2011-2014 The University of Monash; Bachelor of Science, Science Scholars Program

2012 The University of Warwick; Monash Abroad Semester Exchange

2005-2010 Tintern Grammar; Victorian Certificate of Education (VCE)

Research Experience

2017- **Pulsars and Transients with MeerKAT**
University of Manchester PhD Thesis
Supervisor: Professor Ben Stappers

I started working as a PhD student at the University of Manchester in September 2017. My PhD studies started with the IAUS337 conference at the Jodrell Bank Observatory. I am working on localising fast radio transients, patricularly fast radio bursts, with MeerKAT as part of the MeerTRAP ((more) TRansients And Pulsars) group. In particular, I am investigating the best method to quickly de-disperse and image the MeerKAT field of view after fast radio transients have been detected in the coherent and incoherent beams in order to confirm the detection and localise the source. I am also working with the ThunderKAT team to investigate flare stars in their imaging observations.

2016-2017 **LOFAR Imaging of the Galactic Plane: Pulsar Wind Nebula G54.1+0.3 and its Environment**
University of Amsterdam Master's Research Thesis
Supervisors: Dr. Jason Hessels, Dr. Jacco Vink, and Dr. Joseph Gelfand

I used the Dutch stations of the LOw Frequency ARray (LOFAR) to image the Galactic Plane. As the standard calibration pipelines are not suitable for imaging complex fields, such as the Galactic Plane, I developed my own pipeline to calibrate the field. Using these observations I showed that there is no forward shock around the pulsar wind nebula G54.1+0.3, making it an extremely close cousin of the Crab Nebula. I also investigated other supernova remnant (SNR) candidates in the field of view, showing that most are not good candidates. I independently discovered a new SNR, G53.41+0.05, and my collaborators and I confirmed that this is in fact a new SNR using archival XMM-Newton observations.

2016 **The Metallicity Dependence of the Period-Wesenheit Relation for RR Lyrae using MAIA**
University of Amsterdam Observation Project at the Mercator Observatory

I was one of seven students who were selected to participate in the Observation Project course. We were required to define our own research goal, write an observing proposal, visit the Mercator telescope on La Palma and perform the observations and the data analysis, and write a report on the project. My partner and I observed two globular clusters, M2 and M15, using the Mercator Advanced Imager for Asteroseismology (MAIA). We were the first Amsterdam students to use the MAIA instrument. We aimed to use aperture photometry to detect RR Lyrae and we endeavoured to measure their periods and magnitudes to investigate the metallicity dependence of the Period-Weisenheit relation.

2014- **Scattering Variablility of the Crab Pulsar**
The Netherlands Institute for Radio Astronomy (ASTRON) International Summer Student Program
Supervisors: Dr Gemma Janssen and Dr. Cees Bassa

At ASTRON I studied the effect of scattering on the pulse profile of the Crab pulsar. I specifically investigated a period of anomalous scattering that occurred from late 2012 until early 2013 using observations from the Westerbork Synthesis Radio Telescope. We modelled the pulse profiles to investigate the scattering, and we investigated unusual transient features on the pulse profile. When I returned to the Netherlands to study at the University of Amsterdam I continued my work with Dr. Janssen and Dr. Bassa. We are currently preparing to publish our work.

2013/2014 **Radio Imaging of the Galactic Centre with the Murchison Widefield Array and the Very Large Array**
The International Centre for Radio Astronomy Research (ICRAR) Summer Studentship
Supervisors: Dr. James Miller-Jones and Dr. Natasha Hurley-Walker

At ICRAR I used data from the Murchison Widefield Array (MWA) and the Very Large Array (VLA) to image and study the Galactic Centre. I produced the very first MWA images of the Galactic Centre. I used Python programming and the Common Astronomy Software Application (CASA) to process the data. I imaged both MWA and VLA data in order to compare the images of the Galactic Centre at the different wavelengths and baselines offered by the two telescopes. As we had access to five wavelengths of MWA data we studied the spectra of the supernova remnants, HII regions and other objects in the field of view.

Papers and Observing Proposals

Searching for a pulsar in G53.41+0.05 - a new supernova remnant detected with LOFAR

During my master's thesis research I independently discovered a new Galactic supernova remnant (SNR), G53.41+0.05. We found that the SNR is quite young, between 2000 and 8000 years old. If there is a young pulsar in the SNR this would be a powerful probe of the properties of the SNR, the supernova explosion, and the progenitor star. I submitted a short proposal to the Arecibo Observatory to search for the pulsar in G53.41+0.05. The proposal was accepted (project ID P3201), and the data were taken in June 2017.

G53.4+0.05 - a new Galactic supernova remnant

I am first author on the paper presenting the discovery and analysis of G53.41+0.05, the new Galactic supernova remnant (SNR) that I found in my LOFAR observations during my master's thesis. The paper also comments on other SNR candidates in the field of view. The paper, Investigating Galactic Supernova Remnant Candidates Using LOFAR, can be found in the Astrophysical Journal and at arXiv.org (arXiv:1706.08826).

Scattering Variabiltiy of the Crab Pulsar

The paper on the work that I began as a summer student at ASTRON in 2014, Scattering features and variability of the Crab pulsar, is now published in the Monthly Notices of the Royal Astronomical Society. This paper investigates scattering features observed on the pulse profile of the Crab pulsar at 350 MHz with the Westerbork Synthesis Radio Telescope.

Conference Presentations

European Pulsar Timing Array Meeting 2017

At the 2017 European Pulsar Timing Array (EPTA) meeting I presented my work on investigating and modelling the scattering variability of the Crab Pulsar.

NAC2017

At the Netherlands Astronomy Conference 2017 I presented my master's thesis work in a talk titled "LOFAR studies of G54.1+0.3 - a close cousin of the Crab". A recording of this presentation can be found at astrolaura.com/posters-talks.

IAUS337: Pulsar Astrophysics - The Next Fifty Years

2017 marks the 50th anniversary of the discovery of pulsars. At the IAU Symposium I presented the work that I began at ASTRON in 2014 in a talk titled "Scattering Variability of the Crab Pulsar". The slides for this talk are available at www.pulsarastronomy.net.

Funding applications

Faculty of Science and Engineering Social Responsibility funding competition

In 2018 I successfully applied for funding through the Faculty of Science and Engineering Social Responsibility funding competition and was awarded £2,850. At the end of 2018 I received a further contribution of £1000 from the JBCA Machine Learning team. This funding is to fly three high school students and a high school teacher to the Emeritus Professor Harry Messel International Science School (ISS 2019) in July 2019 and is particularly aimed at disadvantaged Greater Manchester students who would otherwise lack the ability to participate in similar science schools and programs. The trip for the students and teacher will be fully paid for, and they are required upon their return to give talks at their schools and at JBCA about their experience at ISS 2019 in order to widen the impact of this program. My role extends to creating a website and application form, advertising for applicants, and selecting the students and teacher who will attend.

Scholarships and Awards

2017 Winner of the De Zeeuw-Van Dishoeck Graduation Prize for the best astronomy master's thesis in the Netherlands

2017 Winner of the best master's thesis at the Anton Pannekoek Institute, the University of Amsterdam

2017 PhD Studentship to attend the University of Manchester

2017 Runner up of the best master's thesis presentation at the Anton Pannekoek Institute, the University of Amsterdam

2015 Merit Scholarship and Holland Scholarship to attend the University of Amsterdam

2011 Member of Australian Mensa Inc

Teaching Experience

2018 **First year physics undergraduate laboratory demonstrator, The University of Manchester**

For this role I instructed first year undergraduate students on two different physics laboratory experiments. This role also involved assessing the students' laboratories and marking student reports. Being an instructor requires strong communication and organisation skills to help students complete their tasks, as well as the ability to explain concepts in multiple ways. My communication skills were especially improved as I was required to details the grades students received for their laboratories and reports. This was challenging if the students struggled with the tasks, but it was important to highlight their strong points and where they required improvement to achieve higher grades.

2012- **VCE Mathematics and Physics Tutor**

I began tutoring high school students in my second year of university. I focused mainly on mathematics tutoring, but I also tutored physics and some biology. When I am in Australia I still have students and I continue to tutor some of these students via email while I am in Amsterdam. As a tutor it is important to be able to think of many ways to explain something in order to help students with different learning styles. Clear communication is vital as well as confidence in my knowledge and ingenuity. It is useful to be able to identify with the students and quickly establish a good rapport. It is important to realise that every student, and every parent, has different goals and to find the best way to cater to the student.

2008-2015 **Tennis Coach, Wonga Park Tennis Club**

I became a Tennis Australia qualified Junior Development coach in 2008. Once I was a qualified coach I began coaching five nights a week. I coached groups of children and one-on-one lessons, working with children as young as three years of age. Coaching involves instructing children as well as communicating with their parents. It often requires problem solving when conflict arises between parents or students, or when differences in standard make it difficult to cater to all skill levels.

2012 **Peer Assisted Study Sessions Leader, Monash University**

My role as a Peer Assisted Study Sessions (PASS) leader was to help first semester philosophy students to settle into university life and achieve the grades they aimed for in philosophy. Being a PASS leader involved problem solving, quick thinking, and adaptability. It required the ability to interact well with students of a similar age while still guiding and instructing them.

Volunteer Positions

2018-2019 **Jodrell Bank Centre for Astrophysics Postgraduate Committee Chair, the University of Manchester**

The postgraduate committee chair is responsible for overseeing the committee and for coordinating the Jodrell Bank Centre for Astrophysics (JBCA) Christmas party. As part of this role I have been coordinating with the new Well-being Officers to put in place RUOK? chats and PGTea, two of my initiatives to improve posgraduate student well-being. This role has particularly helped improve my leadership skills as I work with the other committee members.

2017-2019 **Co-organiser of the JBCA Autumn Computing Sessions (JACS), The University of Manchester**

JACS is a program of weekly talks about computing and academia given by JBCA and University of Manchester staff. This includes talks about open science, backing up work, and python skills. The website, including the program of talks, can be found here. This role involves organisation and communication skills; to find speakers, discuss topics, arrange times for the talks, and to encourage JBCA students and staff to attend the talks.

2018- **Weston Hall Residential Life Advisor**

The halls of residence at the University of Manchester Residential Life Advisors (RLAs) are the first point of contact for students living in university accommodation. As an RLA I am on duty overnight for approximately two nights in a fortnight. This involves patrolling the halls to ensure students are safe and are respecting each other regarding noise and cleanliness. I also meet with my designated flats regularly to ensure that their accommodation and studies are going well and that they are keeping their flat tidy. It is important for RLAs to have strong communication and conflict resolution skills as we are often interacting with students, both undergraduate and postgraduate, and also warning and reprimanding students. To improve my skills as an RLA I have attended some training sessions run by the University, for example basic life support training and take care of your mate mental health support training.

2017 **Coordinating Master's Information Talks**

At the University of Amsterdam the first year astronomy & astrophysics masters students select their own research supervisor for their second year project by contacting potential supervisors, meeting with a few staff members to discuss potential projects, and then selecting their supervisor. I noticed in my first year that this often meant that the same staff were selected to supervise as they had current students (who encouraged new students to contact their own supervisor) or they taught some of the first year courses. Many other staff members who had less contact with the first year students were never contacted, despite having access to excellent data sets and potential projects. To remedy this I organised weekly talks where two or three staff members, and sometimes a current second year student, would present their research area and any possible masters research project ideas. The talks were once a week for 8 weeks. The feedback from the students was excellent and many staff who previously did not have students were contacted for projects.

2012- **Outreach and Science Communication**

At the institutes that I have studied at I have volunteered to assist with outreach events. While at the University of Manchester I have volunteered for many events including the Bluedot Festival, Girls Night Out, ScienceX at the Trafford Centre and much more. I have given talks to schools and university students, introduced speakers, worked on booths, explained the Pulsar Hunters project and website to the general public, both children and adults, and chatted about science. While I was at the University of Amsterdam I assisted with the Science Park Open Day, interacting with visitors to the Science Park campus, and gave talks at Master's Open Evenings. I have spoken to the Rotary Club of Lilydale about my studies and my future endeavours. In early 2018 I spoke to primary school students at Manchester Primary School in Melbourne. In July 2016 I spoke on three alumni panels at Monash University, including speaking and answering questions at their careers evening. I also visited my high school, Tintern Grammar, and spoke three times, to different year levels. Assisting with outreach and science communication has improved my skills at communicating with a wide range of audiences in a range of different settings. This has also improved my public speaking skills.

Work Experience

2014 **Monash Abroad Student Experience Coordinator, Monash University**

The Student Experience Coordinator of Monash Abroad is responsible for coordinating the Global Officer program including supervising and scheduling the Global Officers. In this position I was involved with organising and assisting at events, running the volunteer program, employing and training new Global Officers, and selecting the next Student Experience Coordinator. During my time as the Student Experience Coordinator I continued to improve upon the skills I learnt as a Global Officer as well as expanding my leadership, communication and organisation.

2013 **Monash Abroad Global Officer, Monash University**

As a Global Officer at Monash University I was responsible for creating a unit database of university subjects. This involved strong organization skills as well as computer skills. I corresponded regularly with university officials, requiring formal communication skills. A large part of my time at Monash Abroad was spent working with the Warwick-Monash Alliance, often participating in brain-storming meetings. This strengthened my confidence in communicating my ideas and assessing the ideas of others. My other role as a Global Officer was communicating with and advising students, both international and local, utilising my problem solving and listening skills.