Juryrapport
De Zeeuw-Van Dishoeck Afstudeerprijs voor Sterrenkunde 2017

Laura Driessen (Universiteit van Amsterdam)
LOFAR observations of pulsar wind nebula G54.1+0.3 and its environment

Dear Laura,

The expert jury has decided to award you the De Zeeuw-van Dishoeck Afstudeerprijs of the "Koninklijke Hollandsche Maatschappij der Wetenschappen"
Congratulations, it is a great honor to receive this prize for your master thesis. From a set of several excellent master theses the jury awarded your master thesis the prize because it was regarded to be of really outstanding quality. This prize is not merely meant as an encouragement, but rather as a token in recognition of exceptional academic quality and we hope to see more of your work in the near future. Since the prize is only awarded to the most outstanding master thesis in astronomy in the Netherlands, we wish to elaborate shortly on why the jury decided to select your thesis.

The research for your master thesis "LOFAR observations of pulsar wind nebula G54.1+0.3 and its environment" was performed under the supervision of Jason Hessels and Jacco Vink at the Sterrenkundig Instituut Anton Pannekoek in Amsterdam.
Your thesis treats LOFAR radio interferometer observations of the Galactic plane. You analyzed the data to study young pulsars. Strong radio ionospheric distortions made the analysis and data reduction a challenging task for which you had to design a new metric to perform the analysis. By carefully selecting the data processing techniques you experimented with four different strategies for calibrating observations with the LOFAR High Band Antenna. Despite these technical challenges you did manage to obtain innovative results.

The jury considers your study of the low-frequency emission of the pulsar wind nebula G54.1+03 as a substantial scientific achievement. In this research, you broaden and improve the spectral energy distribution of this object and you demonstrate that the nebula is not enveloped by a shell. You show that the object belongs to the class of "plerion" nebula, just like another famous supernova remnant: the Crab nebula. In addition, you demonstrate that several objects earlier identified as supernova remnants are possibly wrongly classified because they remain undetectable at low radio frequencies by LOFAR. And, as if that is not enough for a masters thesis, you also discovered a new supernova remnant, G53.41+0.03, which designation indicates that it is situated close to the Galactic plane.

Your thesis reads as an exciting novel, in which profound technical descriptions are followed by new results and original research. Your approach to scientific questions demonstrates perseverance and creativity, in particular at times that all earlier tried approaches appeared to fail. During your work, you have demonstrated independence and drive with regard to solving research problems. Two qualities, on top of intelligence and background knowledge, that are essential for a successful career in astronomical research.

The jury is also impressed by the appendix in which you present the entire source code of your galactic-plane calibration-code. Open source is of the essence for excellent research and for proper exchange of information on a professional level. The jury is quite happy that you have clearly realized this important aspect in publishing research endeavours.
Finally, the jury is also glad to notice that you spend time popularizing astronomy by organizing contests in programming and by giving public lectures.

Prof. dr. ir. J.A.M. Bleeker, oud-algemeen directeur SRON-Nederlands Instituut voor Ruimte-onderzoek, oud-hoogleraar ruimteonderzoek Universiteit Utrecht
Prof. dr. S.F. Portegies Zwart, hoogleraar computationele astrofysica en numerieke ster-dynamica Universiteit Leiden

The jury meeting took place on 20 October 2017 and was chaired by Prof. dr. A.P. IJzerman, Secretary of Natural Sciences KHMW; also attended Drs. S. van Manen, Secretary and S. de Boer (minutes).