KONINKLIJKE
HOLLANDSCHE MAATSCHAPPIJ
DER WETENSCHAPPEN

Juryrapport
KHMW Jong Talent Afstudeerprijzen voor Sterrenkunde 2023

David Konijn MSc, University of Amsterdam/Vrije Universiteit Amsterdam
Monitoring the Hyperactive Repeating Fast Radio Burst source FRB 20220912A with the Nancay radio telescope

David Konijn has conducted a very exciting master research project on so-called 'Fast Radio Bursts (FRBs)'. One would maybe think that the Universe only varies on very long timescales, but this is not the case. Fifteen years ago it was discovered that there are enormous bursts of emission at radio wavelengths that last only a fraction of a second, but with an energy output of up to millions times of that of the Sun. Possible mechanisms involve enigmatic objects such as hyper-magnetized neutron stars or black holes.

David developed a new algorithm to search for radio bursts in repeating FRBs, focusing on radio observations of FRB 20220912A from the Nancay radio telescope in France. Analyzing many observations he discovered more than 700 individual bursts – showing this source to be extremely active, having much more frequent bursts than expected. This alone is already a fantastic result, but Mr. Konijn went much further, devising an automatic classification system with duration, spectral extent, arrival time and such, showing that one-off FRB's may actually be repeating bursters for which we only see the brightest event. A very interesting result.

David Konijn has a bright future ahead of him, graduating cum laude, already started a PhD in Groningen – applying many skills he developed during his master research.

Hannah Wichern MSc, Radboud University
An Off-axis Short Gamma-Ray Burst Afterglow Scenario for Extragalactic Fast X-ray Transients

Hannah Wichern's Master's thesis was on the topic of Fast X-ray Transients, an enigmatic phenomena where very short-lasting flashes of X-rays are seen. Sofar these have not been tied directly to a physical origin, which could include the plunging of a white dwarf stellar remnant into a massive black hole or the merger of two neutron stars seen off-axis.

In the MSc thesis Hannah has investigated this last possibility, by comparing the signals of known neutron star mergers, seen as Fast Gamma-Ray Bursts or Gravitational wave sources, with models of these explosions and then using the models to extract the expected X-ray signal when the explosions are seen when the main axis is not pointed to the observer on Earth.

Hannah's thesis admirably weaves together observations of one phenomenon (Fast X-ray Transients) with models and then extracts again the would-be observations of a completely different phenomenon (neutron star mergers). The level of detail to the known literature is

very high standing and conscientious. The conclusion that these two phenomena are probably not the same is very interesting and could only be drawn from the quality of the MSc research and thesis.

After completing her MSc Hannah has now started a PhD project at the Danish Technical University in Copenhagen, where she will now work on further unravelling the mysteries of transient phenomena in the Universe.

Prof. dr. P.J. (Paul) Groot, hoogleraar sterrenkunde Radboud Universiteit
Prof. dr. I.A.G. (Ignas) Snellen, hoogleraar sterrenkunde Universiteit Leiden en wetenschappelijk directeur Sterrewacht Leiden

De jury vergaderde op 10 oktober 2023 via Zoom onder leiding van KHMW-maatschappelijk lid Mr. M. (Mieke) Zaanen. Tevens was ter vergadering aanwezig Prof. dr. A.P. (Ad) IJzerman, bestuurslid en secretaris natuur- en medische wetenschappen KHMW.