

Jan van Roestel

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Current

2013-present

PhD in Astronomy and Physics, Radboud University; supervisors P.J. Groot & S.R. Kulkarni (Caltech)
Thesis: “*Fast optical variability with the Palomar Transient Factory*”

For my PhD thesis, I use data from the Palomar Transient Factory to determine the rate of intra-night transients in preparation for the search for Kilonova. In addition, I also worked on short period eclipsing white dwarf binary stars in PTF, a continuation of my master project and part of my PhD thesis.

Education

2011-2013

MSc in Astronomy and Physics, *Cum Laude*, Radboud University; supervisor P.J. Groot

Thesis topic: *A new eclipsing white dwarf - red dwarf binary star in the CV period gap*. As part of my curriculum, I did the courses “Star and Planet formation” (6 ECTS) at the University of Amsterdam and attended the “Binary stars” summer-school (3 ECTS) at Leuven University (BE).

2008-2011

BSc in Physics, Radboud University; thesis supervisor G. Nelemans

Thesis topic: *Radial velocity amplitude of a pulsating sdO star*.

Computer skills

Programming: PYTHON, L^AT_EX, SHELL

Data tools: NUMPY, SCIPY, PANDAS, EMCEE, SKLEARN, XGBOOST

Astrophysics: IRAF, ASTROPY, LCURVE, MOLLY, automated reduction pipelines for imaging and spectroscopic data

Observing experience

2017

PI for 3 nights at the WHT to perform radial velocity and high cadence photometric follow-up of WD-RD EBs found with PTF.

July/August 2017

Assembling and commissioning the MEERlicht telescope at Sutherland Observatory, SA (<http://meerlicht.org/>)

2015-2017

PI for 17 nights to obtain phase-resolved spectroscopy with IDS@INT of EL CVn binaries.

2015

PI for 7 nights for spectroscopic follow-up of Galactic transients with the IDS@INT.

2015

2 nights of high cadence spectroscopy with ISIS@WHT.

2012-2015	6 nights as co-observer for ULTRACAM with the WHT
2012-2015	~ 4 weeks of observing for Galactic plane surveys IPHAS/UVEX with the WFC@INT
2014	0.5 nights as co-observer for M31 quasars with the Keck telescope.
2013	2 nights as co-observer for iPTF transient follow-up with DBSP@Hale

Talks & posters

Feb. 2018	I presented my PhD work with PTF as the seminar speaker at KU Leuven (40 minutes).
Feb. 2017	A 20 minute talk at the Kavli Institute (Santa Barbara, USA) as part of the DISK program presenting my work on machine learning classification of low-mass white dwarfs.
Oct. 2016	20 minute talk at the conference “Hot-wiring the transient Universe” (Villa Nova Univ., USA) about transient rates and the Galactic foreground fog with PTF.
May 2016	Poster presentation at the Sackler Conference (Harvard, USA)
May 2014	15-minute talk about intra-night transients at the PTF collaboration meeting (Stockholm, SE).
May 2014	15-minute talk at the Dutch Astronomy Conference about PTF transients.

Teaching

Feb.-June '17	Supervisor of Bachelor student Rutger Jaspers for his BSC thesis. The project is to obtain high cadence photometry using the Nijmegen 35cm telescope of bright, hot white dwarfs to find short orbital period systems.
Oct.'16-Feb.'17	Supervisor of Bachelor student Rick Oosterwijk for his BSC thesis. The project involved light curve modelling of ULTRACAM data to determine the system parameters of a short period eclipsing SdB-M binary.
Aug. 2014	Making and presenting a problem session for the PTF summer school . I was in charge of making the content for a 2-hour long problem session about Cataclysmic Variables. The goal of the problem-session was to learn how to use the PTF variable star lightcurves to find an outbursting object among the large sample.
2013-2016	Coordinator of the problem classes and TA for “Introduction in programming”, a course for ~150 first year Physics and Math students. I was responsible for the logistics of the problem classes as well as helping students with any questions related to the content of the course.
2011-2015	Teaching assistant for “Observational astronomy” (2x), “Introduction to Cosmology”, “Introduction to Astronomy” (2x),

Outreach

2015&2016	A 45-minute talk about the transient universe for the general public visiting the open observing night at Radboud University.
2016	Co-organising the observations of the transit of Mercury .
2011-2016	Giving telescope tours for prospective students and the general public. Showing the two optical telescopes at the Radboud University and explaining how they work and what we study with optical telescopes.

Publications and projects

PI/first author:

- 2017 The discovery and analysis of **eclipsing white dwarf - M-dwarf binary** PTF0857. I combined high cadence photometry with phase-resolved spectroscopy to determine the system parameters using Bayesian statistics. This eclipsing white dwarf - red dwarf binary has an orbital period of only 2.5 hours. This puts this binary in the CV period gap. The canonical CV evolution theory predicts that CV will cease mass-transfer, and will look like detached systems. With our knowledge of the system parameters, we concluded that PTF0857 is not likely to be such a systems, but emerged from the common envelope as we observe it today. [van Roestel et al. \(2017\)](#)
- 2017 **EL CVn binaries in PTF**. I developed a machine learning method to discover EL CVn binaries (eclipsing binaries containing a pre-He-WD) in PTF light curve data, more than doubling the known sample size. In addition, I obtained spectroscopic follow-up observations using the IDS@INT (17 nights). We have determined the system parameters for all systems. We show that there are a large number of pre-He-WDs observable. Detailed follow-up of these systems will enable a detailed test of low mass stellar evolution models, binary interaction models and pulsation models of low mass white dwarfs. [van Roestel et al. \(2018\)](#)
- present The **Sky2Night project** is an 8-day project were we used the PTF telescope to systematically observe 400 deg^2 at a 2-hour cadence. At the same time, we used the WHT telescope to observe all new transients discovered in this field, to get an unbiased sample of transients. With the data I have determined a robust observed rate for extra-Galactic and Galactic transients. In addition, we have calculated an upper-limit to the rate of fast optical transients. This work is in preparation for the systematic search for Kilonovae (the optical counterparts to NS-NS mergers detected by LIGO/Virgo). For this project, I have been responsible for the analysis and interpretation of the data. *Paper in prep.*
- present The **Sky2Night 2&3** projects are two week-long projects where we used the PTF telescope to systematically observe a large field on the sky at low Galactic latitudes ($|b| < 20$). During the same time, we used a dedicated telescope (INT, P60+P200) to observe all new transients discovered in this field, to get an unbiased sample of transients. The main goal of this project is to explore the fast transient sky in our own Galaxy, and determine the observed rate of (mainly interacting binaries). The proposals, planning, execution and analysis of these two short projects were entirely done by me. *Paper in prep.*
- present **Eclipsing white dwarf – red dwarf binaries** Canonical CV evolution theory predicts that CVs will go through a detached phase at orbital periods of 3 to 2 hours, the CV period gap. This should produce an excess of detached systems at these orbital periods. To test this, we used machine learning methods to find a large sample of eclipsing WD-RD binaries. With iPTF data alone, we have identified 30 new detached eclipsing WD-RD binaries, significantly increase the known sample size (77). Four of the newly discovered binaries have orbital periods in the period gap, more than doubling the known sample at these periods. I am currently obtaining follow-up data to fully characterize these systems. *Work in progress*

Contributions as a co-author:

- 2018 Contribution as an observer to [Green et al. \(2018\)](#).
- 2017 For OW J074106.0-294811.0, a 44-minute sdO binary, I did the light curve analysis and calculation of the system parameters. Third author, [Kupfer et al. \(2017a\)](#).
- 2017 A project where we used Artificial Neural Networks to identify transients. I provided input about transient identification and did some minor programming. [Gieseke et al. \(2017\)](#).
- 2017 Contribution as an observer to [Macfarlane et al. \(2017\)](#).
- 2016 The discovery of the first “white dwarf pulsar”! I obtained high cadence spectroscopy of AR Sco which shows the rapid spectral evolution of the system (~ 2 minutes). [Marsh et al. \(2016\)](#).
- 2016 For PTF1 J0823, one of the shortest period eclipsing SdB binaries, I did the light curve analysis and calculation of the system parameters. Second author, [Kupfer et al. \(2017b\)](#).
- 2014 Contribution as an observer to [Barentsen et al. \(2014\)](#).

References

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