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# Daniela Huppenkothen

*Curriculum Vitae*

## Experience

Associate Director and DIRAC Fellow — 2017–present
*DIRAC Institute, University of Washington, USA*

Data Science Fellow — 2017–present
*eScience Institute, University of Washington, USA*

James Arthur Postdoctoral Fellow — 2016–2017
*Center for Cosmology and Particle Physics &*
*Center for Data Science, New York University, USA*

Moore-Sloan Data Science Postdoctoral Fellow — 2014–2017
*Center for Data Science, New York University, USA*

## Education

PhD Astronomy & Astrophysics — 2010–2014
*Anton Pannekoek Institute for Astronomy, University of Amsterdam, The Netherlands*
Thesis: *A New Statistical Toolbox for Studying Variability in Fast Transients*
Supervisors: Dr Anna Watts and Prof Michiel van der Klis

MSc Astronomy & Astrophysics — 2008–2010
*Anton Pannekoek Institute for Astronomy, University of Amsterdam, The Netherlands*

BSc Geosciences & Astrophysics — 2005–2008
*Jacobs University Bremen, Germany*

## Publications

29 refereed; 6 non-refereed; 2 under review; List attached.

## Presentations

14 invited, 22 seminars and 13 contributed. List attached.

## External Grants

Co-PI: Call for 7th and 8th Cambridge Astronomy Kavli Workshops — 2018
*Astro Hack Week: Data Science for Next-Generation Astronomy*
£15,000

PI: NASA Astrophysics Data Analysis Program — 2017-present
*Accurate Black Hole Spin Measurements with ABC*
$385,000

Co-PI: Astro Hack Week Funding Proposal to Google Inc. — 2017-2018
*Astro Hack Week: Enabling Young Astronomers to Develop Data Science Skills*
$20,000

PI; Fermi Guest Investigator Program — 2016
*Unravelling Solar Flare Variability with Fermi/GBM*
$55,000

PI; LSSTC Enabling Science Program 2015
*Astro Hack Week: Enabling Young Astronomers to Develop Data Science Skills*
$5,000

PI: Astro Hack Week Funding Proposal to GitHub Inc. 2015
*Astro Hack Week: Enabling Young Astronomers to Develop Data Science Skills*
$5,000

## Honours and Awards

Third prize, SciPy John Hunter Excellence in Plotting Contest 2018

HSP Huygens scholarship covering tuition and a living stipend 2008-2010

Scholarship awarded by "Studienstiftung des Deutschen Volkes" (German National Academic Foundation) 2005-2010
*€200 per month for study-related expenses*

Merit-based scholarship awarded by Jacobs University Bremen 2005-2008
*€7500 per year for tuition costs*

Member of "President's List" (students with GPA better than 1.5) 2005-2008

Award of the Deutsche Physikalische Gesellschaft (German Society of Physicists) for best graduating student in physics 2005

## Software

Stingray
*Lead developer of open-source Python time series methods library for astronomy: http://github.com/StingraySoftware/stingray*

Entrofy
*Lead developer of open-source Python package for cohort selection: http://github.com/dhuppenkothen/entrofy*

Magnetron
*Bayesian Hierarchical Inference for X-ray light curves: http://ascl.net/1502.014*

BayesPSD
*Bayesian time series methods for detection of periodic signals: https://github.com/dhuppenkothen/BayesPSD*

## Teaching

### *Lectures*

IESC Summer School: Analytics, Inference, and Computation in Cosmology: Advanced methods 2018
*Three interactive lectures on Bayesian hierarchical inference, probabilistic models and machine learning*

Astro Hack Week 2014-2018
*Lectures on data visualization, exploratory data analysis, statistics to an audience of researchers at all academic ranks*

LSST Data Science Fellowship Program 2017
*Two lectures on data visualization and interpretability of machine learning algorithms to an audience of graduate students*

IMPRS Heidelberg Summer School on Astrostatistics and Data Mining 2016
*Five lectures and three problem classes on Bayesian and frequentist statistics, counting statistics, time series analysis and Fourier methods to an audience of graduate students and postdocs*

Deutsche Schülerakademie 2012
*Ten-day course in astronomy for gifted high-school students*

## *Teaching Assistant Posts*

- Accretion Flows (M.Sc. course), University of Amsterdam — 2008–2014
- Astrophysics II (B.Sc. course), University of Amsterdam
- Introduction to Astronomy and Cosmology (B.Sc. course), University of Amsterdam
- Fluid Dynamics, (M.Sc. course), University of Amsterdam
- Geosciences and Astrophysics II (B.Sc. course), Jacobs University Bremen

## *Research Supervision*

Leah Fulmer, graduate student (University of Washington) — 2018-present
*Project title: "Unsupervised Machine Learning for Irregularly Sampled Astronomical Time Series from the ZTF Survey"*

Margaret Lazzarini, graduate student (University of Washington) — 2018-present
*Project title: "Accurate Black Hole Spin Measurements through ABC"*

Christina Lindberg, post-bacchalaurete student (University of Washington) — 2018-present
*Project title: "Precise Measurements of Asteroid Periods using Gaussian Processes"*

Chris Ick, Fermi Guest Investigator Programme student (New York University) — 2017-present
*Project title: "Unravelling Solar Flare Variability with Fermi/GBM"*

Himanshu Mishra, Google Summer of Code — 2016
*Project title: "A Library of Time Series methods"*

Viviana Meerstra, BSc project (University of Amsterdam) — 2012
*Project title: "Timing analysis of gamma-ray bursts using Bayesian statistics"*

Oliver Gurney-Champion, MSc project (University of Amsterdam) — 2011
*Project title: "Modeling of the ionizing effects of black holes on their environment"*

## *Mentoring and Outreach*

Astronomy on Tap — 2018
*How to Teach an AI to Study Black Holes*

NYAS Project *1000 Girls, 1000 Futures*: mentored a female high school student interested in the natural sciences — 2016-2017

Project *CyberMentor*: mentored two female high school students interested in the natural sciences — 2011-2012

## Professional Development

Leadership Academy, German Scholars Organization — 2018
*Two 5-day intensive workshops on leadership and management practices*

## Service to Profession

Scientific Advisory Committee, ASTRON, The Netherlands — 2018-present

Chair, DIRAC Postdoctoral Fellows Hiring Committee — 2017-present

Scientific Organizing Committee, Astro Hack Week (chair in 2015, 2017, and 2018) — 2014-present
*http://astrohackweek.org/2018/*

Invited referee for Nature, ApJ, MNRAS, A&A — 2013-present

Mini-Symposium Chair, SciPy — 2018
*https://scipy2018.scipy.org/*

Scientific Organizing Committee, Python in Astronomy — 2017-2018
*http://openastronomy.org/pyastro/2018/*

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| Program Committee, JupyterCon | 2017 |
| Organizer, NYU Center for Data Science Lunch Seminar Series | 2016 |
| Organizer, Journal Club at the Astronomical Institute of the University of Amsterdam | 2013-2015 |
| Local Organizing Committee, LOFT Science Meeting | 2011 |
| Local Organizing Committee, 2nd Summer School on Multiwavelength Astronomy, Amsterdam | 2010 |

# Daniela Huppenkothen

## *Publications*

*Lead Author*

Entrofy Your Cohort: A Data Science Approach to Candidate Selection
Huppenkothen, D., McFee, B., Norén, L.; (submitted to PLOS One)

Stingray: A Modern Python Package for Spectral Timing
Huppenkothen, D. et al.; (submitted to ApJ)

Hack Weeks as a Model for Data Science Education and Collaboration
Huppenkothen, D. et al.; *Proceedings of the National Academy of Sciences* (2018)

On the Statistical Properties of Cospectra
Huppenkothen, D. & Bachetti, M.; *Astrophys. J. Sup.* 236 p.11pp (2018)

Exploring the Long-Term Evolution of GRS 1915+105
Huppenkothen, D. et al.; *Mon. Not. R. Astron. Soc.* 466 p.2364-2377. (2017)

Detection of Very Low-Frequency Quasi-Periodic Oscillations in the 2015 Outburst of V404 Cygni
Huppenkothen, D. et al.; *Astrophys. J.* 834 17 pp. (2017)

Dissecting magnetar variability with Bayesian hierarchical models
Huppenkothen, D. et al.; *Astrophys. J.* 810 22 pp. (2015)

Quasi-periodic Oscillations in Short Recurring Bursts of Magnetars SGR 1806-20 and SGR 1900+14 Observed with RXTE
Huppenkothen, D. et al.; *Astrophys. J.* 795 114 pp. (2014)

Intermittency and Lifetime of the 625 Hz Quasi-periodic Oscillation in the 2004 Hyperflare from the Magnetar SGR 1806-20 as Evidence for Magnetic Coupling between the Crust and the Core
Huppenkothen, D. et al..; *Astrophys. J.* 793 129 pp. (2014)

Quasi-Periodic Oscillations in the Short Recurring Bursts of the Soft Gamma Repeater J1550-5418
Huppenkothen, D. et al..; *Astrophys. J.* 787 128 pp. (2014)

Quasi-Periodic Oscillations and Broadband Variability in Short Magnetar Bursts
Huppenkothen, D. et al.; *Astrophys. J.* 768 87 pp. (2013)

*Contributing Author*

Introducing Bayesian analysis with M&Ms: An active-learning exercise for undergraduates
Eadie, G.; Huppenkothen, D. et al.; *The Journal of Statistics Education* (in press).

The Zwicky Transient Facility: Science Objectives
Graham, M. et al.; including Huppenkothen, D.;; *Publications of the Astronomical Society of the Pacific* (in press).

Constraining the limiting brightness temperature and Doppler factors for the largest sample of radio bright blazars
Liodakis, I.; Hovatta, T.; Huppenkothen, D. et al.; *Astrophys. J.* (in press).

The first tidal disruption flare in ZTF: from photometric selection to multi-wavelength characterization
van Velzen, S. et al.; incl. Huppenkothen, D. et al.; *Astrophys. J.* (in press).

Detection of non-thermal X-ray emission in the lobes and jets of Cygnus A
de Vries, M.; Wise, M. W.; Huppenkothen, D. et al.; *Mon. Not. R. Astron. Soc.* 478 p.4010-4029 (2018).

No Time for Dead Time: Use the Fourier Amplitude Differences to Normalize Dead-time-affected Periodograms
Bachetti, M. & Huppenkothen, D.; *Astrophys. J.* 853 6 pp. (2018)

The rotational phase dependence of magnetar bursts
Elenbaas, C.; Watts. A.L.; Huppenkothen, D.; *Mon. Not. R. Astron. Soc.* 476 p.1271-1285 (2018)

APO Time-resolved Color Photometry of Highly Elongated Interstellar Object 1I/'Oumuamua
Bolin, B. et al.; including Huppenkothen, D.; *Astrophys. J.* 852 10 pp. (2018)

Magnetar giant flare high-energy emission
Elenbaas, C.; Huppenkothen, D. et al.; *Mon. Not. R. Astron. Soc.* 471 p.1856-1872 (2017)

X-ray and radio observations of the magnetar SGR J1935+2154 during its 2014, 2015, and 2016 outbursts
Younes, G. et al, including Huppenkothen, D.; *Astrophys. J.* 847 15 pp. (2017)

Burst and Outburst Characteristics of Magnetar 4U 0142+61
Gögüs, E. et al., including Huppenkothen, D.; *Astrophys. J.* 835 8 pp. (2017)

Magnetar-like X-Ray Bursts from a Rotation-powered Pulsar, PSR J1119-6127
Gögüs, E. et al., including Huppenkothen, D.; *Astrophys. J. Letters* 829 7 pp. (2016)

False periodicities in quasar time-domain surveys
Vaughan, S. et al., including Huppenkothen, D.; *Mon. Not. R. Astron. Soc.* 461 3145 pp. (2016)

The wind nebula around magnetar Swift J1834.9-0846
Younes, G. et al., including Huppenkothen, D.; *Astrophys. J.* 824 12 pp. (2016)

The Five Year Fermi/GBM Magnetar Burst Catalog
Collazzi, A.C. et al., including Huppenkothen, D.; *Astrophys. J. Sup.* 218 11 pp. (2015)

Time Resolved Spectroscopy of SGR J1550-5418 for the Fermi/GBM Bursts
Younes, G. et al., including Huppenkothen, D.; *Astrophys. J.* 785 52 pp. (2014)

The Outflow History of Two Herbig-Haro Jets in RCW 36: HH1042 and HH1043
Ellerbroek, A.M. et al., including Huppenkothen, D.; *Astron. Astrophys.* 551 A5 pp. (2013)

Detection of Spectral Evolution in the Bursts Emitted During the 2008-2009 Active Episode of SGR J1550-5418
von Kienlin, A. et al., including Huppenkothen, D.; *Astrophys. J.* 755 150 pp. (2012)

Using the X-ray Morphology of Young Supernova Remnants to Constrain Type, Ejecta Distribution and Chemical Mixing
Lopez, L.A. et al., including Huppenkothen, D.; *Astrophys. J.* 732 114 pp. (2011)

Typing Supernova Remnants Using X-ray Line Emission Morphologies
Lopez, L.A. et al., including Huppenkothen, D.; *Astrophys. J.* 706 106 pp. (2009)

## Non-refereed

ZTF Bright Transient Survey Classifications
Graham, M.L. et al., including Huppenkothen, D.; *Astronomer's Telegram* 11745 (2018)

The LOFT mission concept: a status update
Feroci, M et al., including Huppenkothen, D.; *Proceedings of the SPIE* 9905 20 pp. (2016)

eXTP – enhanced X-ray Timing and Polarimetry Mission
Zhang, S.N. et al., including Huppenkothen, D.; *Proceedings of the SPIE* 9905 16 pp. (2016)

Python in Astronomy 2016 Unproceedings
Robitaille, T. et al., including Huppenkothen, D.; DOI: 10.5281/zenodo.56793

FERMI/Gamma-ray Burst Monitor upper limits assuming a magnetar origin for the repeating Fast Radio Burst source, FRB 121102
Younes, G. et al., including Huppenkothen, D.; Astronomer's Telegram, 8781

New Methods for Timing Analysis of Transient Events, Applied to Fermi/GBM Magnetar Bursts
Huppenkothen, D. et al.; Proceedings of the 4th International Fermi Symposium, 2013, arXiv: 1303.1370

# Daniela Huppenkothen

## *Presentations*

### Invited

Astronomy in the Age of Data Science 2018
*NASA Science Mission Directorate Workshop on Maximizing the Scientific Return of NASA Data, Washington D.C., USA*

Hack Weeks as a Model for Data Science Education and Collaboration 2018
*Keynote Presentation, Moore-Sloan Data Science Summit, Park City, UT, USA*

Bayesian Inference for X-ray Timing 2018
*42nd COSPAR Scientific Assembly, Pasadena, CA, USA*

Data Science: Notes from an Emerging Field 2018
*Open Questions in Astrophysics, Copenhagen, Denmark*

Machine Learning in the Age of Survey Astronomy 2018
*XMM-Newton 2018 Science Workshop, Madrid, Spain*

From Asteroids to Black Holes: Data Science in Time Domain Astronomy 2018
*University of Washington Data Science Summit, Seattle, WA, USA*

Classifying Black Hole States: Lessons Learned in Machine Learning 2018
*231st Meeting of the American Astronomical Society*

The Whole is Greater than the Sum of its Parts: Better Inference Through Bayesian Hierarchical Modelling 2017
*16th Meeting of the High-Energy Astrophysics Division of the American Astronomical Society*

Time Series Analysis for a Multiwavelength Future 2016
*HAP Workshop: Monitoring the Non-Thermal Universe, Cochem, Germany*

Timing V404 Cygni during its 2015 outburst 2016
*11th INTEGRAL Conference, Amsterdam, The Netherlands*

Ripples in a Stormy Sea: Quasi-Periodic Oscillations in the Fermi Gamma-Ray Burst Monitor 2015
*6th International Fermi Symposium, Arlington, VA, USA*

Probing Neutron Star Physics with Quasi-Periodic Oscillations in Magnetar Bursts 2015
*Spring Meeting of the American Physical Society, Baltimore, MD, USA*

Magnetars, QPOs and the Neutron Star Crust 2014
*FUSTIPEN Topical Meeting "Structure of the neutron star crust: experimental and observational signatures", Caen, France*

## Colloquia & Seminars

From Asteroids to Black Holes: Data Science in Time-Domain Astronomy 2019
*Astronomy Seminar, University of Tübingen, Germany*

From Asteroids to Black Holes: Data Science in Time-Domain Astronomy 2019
*Astronomy Colloquium, Pennsylvania State University*

From Asteroids to Black Holes: Data Science in Time-Domain Astronomy 2019
*Astronomy Colloquium, University of Illinois at Urbana-Champaign*

From Asteroids to Black Holes: Data Science in Astronomy 2018
*Computing PNNL Lecture Series, Pacific Northwest National Laboratory, Richland, WA*

Fun Statistics with Fourier Spectra 2018
*Harvard-California Astrostatistics Collaboration Seminar, Center for Astronomy, Harvard University, USA*

X-ray Astronomy in the Era of Data Science 2018
*Physics Colloquium, University of Delaware, USA*

Data Science for X-ray Astronomy 2017
*Astronomy Colloquium, University of Washington, USA*

Wrong But Useful: Statistics and Machine Learning for High-Energy Astrophysics 2017
*Physics Colloquium, Rheinisch-Technische Universität Aachen, Germany*

How to Time a Black Hole: Time series Analysis for the Multi-Wavelength Future 2017
*Astronomy Seminar, Technical University Dortmund, Germany*

Improving Candidate Selection for Academic Conferences and Beyond 2017
*Seminar at the European Space Research and Technology Centre (ESTEC), The Netherlands*

Exploring the Long-Term Evolution of Black Holes with Machine Learning 2017
*Leiden Faculty colloquium*

How to Time a Black Hole: Unravelling fundamental physics with X-ray variability 2017
*Chodera Lab Seminar, Memorial Sloan-Kettering Cancer Center, USA*

How to Time a Black Hole: Time Series Analysis for the Multi-Wavelength Future 2017
*Astronomy Seminar, University of Würzburg, Germany*

Why your field needs a hack week 2016
*BIDS Data Science Lecture Series, University of California Berkeley, USA*

Exploring the Violent Universe: A Data Science Approach to X-ray Astronomy 2016
*The 4th Annual DC/VA/MD Summer Astrophysics Meeting, George Washington University, Washington, DC, USA*

Timing Black Holes: Unravelling Fundamental Physics with X-ray Variability 2016
*Statistics colloquium, University of Auckland, New Zealand*

Exploring the Violent Universe: A Data-Driven Approach to X-ray Astronomy 2015
*Physics colloquium, George Washington University, Washington, DC, USA*

Are magnetar short bursts caused by star quakes? Using burst variability to constrain magnetar physics 2015
*HEAD lunch seminar, Center for Astrophysics, Harvard University, Cambridge, MA, USA*

Unravelling Magnetar Variability: A data-driven approach to X-ray timing 2015
*Chandra X-ray Telescope Grou, MIT, Cambridge, MA, USA*

Searching the Haystack of Magnetar Bursts 2014
*SPIMAX Seminar, University of Oxford, Oxford, UK*

A Zoo of Magnetar Bursts: Understanding Magnetar Variability 2013
*Monash University, Melbourne, Australia*

Assessing the Impact of UV/X-ray Emission from Accreting Black Holes on the ISM 2010
*Colloquium, Dr. Karl Remeis-Sternwarte Bamberg, Germany*

## Contributed

Here Be Dragons: Effective (X-ray) Timing with the Cospectrum 2018
*231st Meeting of the American Astronomical Society, Washington DC, USA*

Entrofy your Cohort 2017
*Moore-Sloan Data Science Summit*

Using Python to Study Black Holes 2016
*PyGotham 2016, New York, USA*

Detection of Low-Frequency Quasi-Periodic Oscillations in the 2015 Outburst of V404 Cygni 2016
*15th Meeting of the High Energy Astrophysics Division of the American Astronomical Society, Naples, FL, USA*

Entrofy: Participant Selection Made Easy 2016
*Python in Astronomy 2016, University of Washington, Seattle, USA*

Quasi-periodic Oscillations in V404 Cygni 2015
*Time Domain Astrophysics with Swift, Clemson, SC, USA*

New Statistical Tools for Studying Variability in Transient Light Curves 2015
*Hot-Wiring the Transient Universe IV, Santa Barbara, CA, USA*

New Methods To Understand Variability in Astrophysical Transients 2013
*Maximum Entropy and Bayesian Inference, Canberra, Australia*

Timing Transients: New Methods To Understand Transient Variability 2013
*Astroinformatics 2013, Sydney, Australia*

Timing Transients: Understanding Magnetar Variability 2013
*Explosive Transients, Lighthouses of the Universe, Santorini, Greece*

Understanding Magnetar Variability: A Magnetar Burst Zoology 2013
*NS2013: Latest Results from the Neutron-Star Laboratory, Amsterdam, The Netherlands*

New Methods for Timing Analysis of Transient Events 2012
*NOVA Network 3 Meeting, Nijmegen, The Netherlands*

New Methods for Timing Analysis of Transient Events 2012
*4th International Fermi Symposium, Monterey, CA, USA*