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Citizenship: Netherlands

Professional Experience

2019 *to present*	**Joint Princeton/Flatiron Postdoctoral Prize Fellow |** Department of Astrophysical Sciences, Princeton University, Princeton, US
2019 *to present*	**Joint Princeton/Flatiron Postdoctoral Prize Fellow |** Center for Computational Astrophysics, Flatiron Institute, New York, US
2018 *to present*	**Member of the Event Horizon Telescope Collaboration**
2018 *to* 2019	**Humboldt Postdoctoral Prize Fellow |** Institute for Theoretical Physics, Goethe University, Frankfurt am Main, Germany

Education

2014 *to* 2018	**Ph.D. in Mathematics |** KU Leuven University, Leuven, Belgium, Thesis advised by Prof. Rony Keppens and Prof. Giovanni Lapenta: "*on magnetic reconnection and particle acceleration in relativistic plasmas*"
2017 *to* 2018	**Visiting Research Scholar |** Department of Astronomy, Columbia University, New York, US, Advisor: Prof. Lorenzo Sironi
2013 *to* 2014	**Part III of the Mathematical Tripos |** University of Cambridge, Cambridge, UK
2009 *to* 2013	**M.Sc. in Physics |** Eindhoven University of Technology, Eindhoven, Netherlands, *average of 8.5/10 (top 3% of the class),* Thesis advised by Prof. GertJan van Heijst: *Stability of two-dimensional zonal flows*
2009 *to* 2013	**M.Sc. in Engineering |** Eindhoven University of Technology, Eindhoven, Netherlands, *average of 8.3/10 (with distinction),* Thesis advised by Prof. Henk Nijmeijer: *Stability of two-dimensional zonal flows*
2011	**Visiting Research Scholar |** Culham Centre for Fusion Energy, Oxford, UK, Advisor: Dr. Rory Scannell
2006 *to* 2009	**B.Sc. in Engineering |** Eindhoven University of Technology, Eindhoven, Netherlands, *with a minor and pre-master in physics*

Research

Primary Interests	Astrophysics: black hole physics, binary neutron stars, pulsars, magnetars, accretion disks, jets, flares, gravitational waves, electromagnetic counterparts, precursors, dark matter Plasma Physics: magnetic reconnection, instabilities, turbulence, particle acceleration mechanisms, waves, pair production
Methods	Theory: general relativity, magnetohydrodynamics, kinetic physics, fluid dynamics, radiation dynamics, quantum field theory, string theory Numerical: computational hydrodynamics and magnetohydrodynamics, particle-in-cell, numerical relativity, monte-carlo techniques

Grants and Awards

Research Grants & Fellowships	Princeton University Initiative for Computational Astrophysics Postdoctoral Prize Fellowship, 2019 *to* 2023
	Flatiron Research Fellow Postdoctoral Prize Fellowship, 2019 *to* 2023
	Harvard University Black Hole Initiative Postdoctoral Prize Fellowship 2019 *to* 2022 (declined)
	Columbia University Theoretical High-Energy Astrophysics Postdoctoral Fellowship 2019 *to* 2023 (declined)
	Humboldt Postdoctoral Prize Fellowship, 2018 *to* 2020
	Research Foundation Flanders (FWO) travel grant (€ 800), 2018
	YouReCa Junior Mobility Program travel grant (€ 4000), 2018
	Research Foundation Flanders (FWO) grant for long term stay abroad (€ 5500), 2017
	Nordita travel grant (2500 SEK), 2015
	FLOF Ph.D. scholarship, KU Leuven University, 2014 *to* 2018
	Hughes Hall Bursary, University of Cambridge (£2500), 2014 (declined)
	DAMTP Ph.D. scholarship, University of Cambridge, 2013 (declined)
	Vreedefonds study grant (€ 6000), 2013
	FuseNet travel grant (€ 2500), 2012
Computing Time as PI	Frontera startup grant, 2020, *Investigating feasibility of neutron star precursor simulations on Frontera,* 100,000 CPU hours
	BrENIAC tier 1 grant, 2019 *to* 2020, *Localising and resolving current*

sheets in black hole magnetospheres, 18 million CPU hours

Xsede startup grant, 2019, *Kink instabilities in astrophysical jets,* 100,000 CPU hours

BrENIAC tier 1 grant, 2019, *Detection of current sheets in kinking relativistic jets,* 7 million CPU hours

BrENIAC tier 1 grant, 2019, *Effects of dark matter charge on plasma accretion flows at the Galactic Centre,* 3.4 million CPU hours

BrENIAC tier 1 grant, 2018, *String theory signatures in black hole shadows,* 3.4 million CPU hours

Cartesius tier 1 grant, 2018, *High resolution simulations of accreting black holes,* 6 million CPU hours

BrENIAC tier 1 grant, 2015 *to* 2017, *Outflows and Particle Evolution in Relativistic Astrophysics I-V,* 11 million CPU hours

Awards & Honors

The 2020 European Physical Society Plasma Physics Division PhD Research Award (€ 1000) | In recognition of truly outstanding research achievements associated with their PhD study in the broad field of plasma physics

2020 Bruno Rossi Prize | As part of the Event Horizon Telescope Collaboration | For their landmark image and analysis of the first shadow of a black hole

2020 Einstein Medal | As part of the Event Horizon Telescope Collaboration | For the first image of the candidate supermassive black hole at the centre of the giant elliptical galaxy M87

2020 Breakthrough Prize in Fundamental Physics ($ 3,000,000) | As part of the Event Horizon Telescope Collaboration | For the first image of a supermassive black hole, taken by means of an Earth-sized alliance of telescopes.

2019 NSF Diamond Achievement Award | As part of he Event Horizon Telescope Collaboration |

Best poster Prize (€ 100), WE-Heraeus Seminar on Accretion in Strong Gravity, 2019

Honorary scholar of Hughes Hall, University of Cambridge, 2014

Leadership Experience

Large Collaborations

Event Horizon Telescope Collaboration | Active member of the theory working group

Technical Experience

Computing skills

Programming languages: Fortran, C++, Python
Codes: development of GRMHD code BHAC: https://bhac.science, development of MHD code MPI-AMRVAC: http://amrvac.org, usage of GPU-based GRMHD code H-AMR, usage of MHD code Athena++: https://princetonuniversity.github.io/athena/, usage of Particle-in-cell code Tristan-MP: https://ntoles.github.io/tristan-wiki/
Analysis: Paraview, Visit, Python, Matlab, Maple, IDL, Mathematica, GNUplot, Matplotlib
Presentation: Latex, Overleaf, Wordpress, Adobe, Microsoft Office, GitLab, GitHub
Operating systems: Linux, MacOS, Windows
HPC: Belgium (Tier-2 cluster ThinKing, Tier-1 cluster MUK, Tier-1 cluster BrENIAC), the US (Frontera, Stampede, CORI NERSC), Germany (JUDGE cluster Jülich, SuperMUC Leibniz), Netherlands (Tier-1 cluster Cartesius)

Communication skills

Spoken languages: Dutch (native), English (full working proficiency, TOEFL score 112, completed courses in Academic Writing and Presenting and English pronunciation skills at the Arenberg Doctoral School of KU Leuven), German (working proficiency)

Teaching and Mentorship

Master students (co)-supervised

Sebastiaan Selvi, M.Sc student at Eindhoven University of Technology and KU Leuven University, 2018, co-supervised with Prof. Rony Keppens, project: resistive magnetohydrodynamics simulations of relativistic reconnection

Doctorate students (co)-supervised

Sebastiaan Selvi, Ph.D. student at University of Amsterdam, 2019 *to* present , co-supervised with Prof. Oliver Porth, project: relativistic magnetic reconnection in kinetic and fluid descriptions

Egor Novoselov, Ph.D. student at Columbia University, 2019 *to* present, co-supervised with Prof. Lorenzo Sironi, project: Magnetar flares in 3D force-free-magnetohydrodynamics simulations

Ashley Bransgrove, Ph.D. student at Columbia University, 2019 *to* present, co-supervised with Prof. Yuri Levin, project: Hall effects in extreme magnetic fields in magnetars

Alexander Chernoglazov, Pre-doc fellow at Flatiron Institute, 2020 *to* present, co-supervised with Dr. Sasha Philippov, project: 3D resistive magnetohydrodynamics simulations of relativistic turbulent

reconnection

Elias Most, Pre-doc fellow at Flatiron Institute, 2019 *to* 2020, co-supervised with Dr. Sasha Philippov, project: Precursor emission from neutron star binaries, submitted paper in Astrophysical Journal letters

Lecturing

Lectures on relativistic magnetohydrodynamics, force-free electrodynamics, numerical methods in astrophysics, for a graduate course in Astrophysical Fluid Dynamics, Astronomy department at Columbia University, 2019 *to* 2020

CSAM-15 Workshop given on Computational Solar and Astrophysical Modeling, Jülich, Germany, September 2015

Teaching Assistant

Undergraduate level mathematics & physics courses at KU Leuven, 2014 *to* 2018 (8 hours per week): Calculus I, Calculus II, Analysis, Differential Equations, Linear Algebra

Graduate level mathematics & physics courses at KU Leuven, 2016 *to* 2017: Computational Methods for Astrophysical Applications

Undergraduate level engineering course at Eindhoven University of Technology, 2011 *to* 2013: Technology Assessment

Service and Organization

Peer Review

Monthly Notices of the Royal Astronomical Society

Colloquia, Meetings & Conferences

Organization of Monthly Plasma Physics Meeting, Center for Computational Astrophysics and Princeton Plasma Physics Laboratory, 2019 *to* present

Chair at ASTRONUM, 13th International Conference on Numerical Modeling of Space Plasma Flows, Panama City Beach, US, June 2018

Local Organizing Committee member, European Physical Society 43rd Conference on Plasma Physics, Leuven, Belgium, July 2016

Local Organizing Committee member, Workshop CSAM-15 on Computational Solar and Astrophysical Modeling, Jülich, Germany, September 2015

Public Outreach

Invited public talk at the public observatory Cozmix, Bruges, Belgium, October 2017

Outreach activities for prospect bachelor students in mathematics and physics at KU Leuven University, development of experiments and tour of

the campus

Outreach activity for annual ladies@science event to promote women in science at KU Leuven University, development of experiments for prospect female bachelor students, https://set.kuleuven.be/en/news/ladies-science-2018

Providing promotional material from simulations for Lynx X-Ray Observatory, https://www.lynxobservatory.com/downloads

Providing simulation data for ADS/CFT themed concert by Valery Vermeulen at the Concertgebouw Bruges, https://www.concertgebouw.be/en/seismik-mikromedas

Talks and Colloquia

Invited talks

Invited talk at 47th EPS Plasma Physics conference, Sitges, Spain, June 2020

Invited talk at ABCD workshop, Leuven, Belgium, April 2020

Invited talk at Gravity Initiative Lunch, Princeton, US, February 2020

Invited talk at MIT PSFC Theory Seminar, Cambridge, US, February 2020

Invited talk at Harvard ITC Luncheon, Cambridge, US, February 2020

Invited talk at Harvard CfA High-Energy Phenomena Seminar, Cambridge, US, February 2020, recorded: https://www.youtube.com/watch?v=344TcsZ0qtQ&t=3625s

Invited talk at Horizon Collaboration Meeting, New York, US, January 2020

Invited talk at GRPIC Workshop, Grenoble, France, November 2019

Invited talk at AMRVAC/BHAC workshop, Amsterdam, The Netherlands, August 2019

Invited talk at GRPIC Workshop, New York, US, March 2019

Invited talk at Palaver Seminar, Frankfurt, Germany, December 2018

Invited talk at AstroCoffee seminar, Frankfurt, Germany, February 2018

Invited talk at Princeton-AstroPlasmas Seminar, Princeton, US, January 2018

Invited talk, public observatory Cozmix, Bruges, Belgium, October 2017

Invited talk at Princeton-AstroPlasmas Seminar, Princeton, US, September 2017

	Invited Talk at Harvard Black Hole Initiative, Cambridge, US, September 2017
	Invited talk at Columbia High-Energy Astrophysics Seminar, New York, US, July 2017
	Invited talk at Princeton-AstroPlasmas Seminar, Princeton, US, July 2017
	Invited talk at CmPA Seminar, Leuven, Belgium, May 2017
	Invited talk at AstroCoffee seminar, Frankfurt, Germany, January 2017
	Invited talk at CmPA Seminar, Leuven, Belgium, June 2015
	Invited talk at Culham Centre for Fusion Energy, Oxford, UK, November 2011
Contributed talks	Talk at APS DPP Mini-conference, Fort Lauderdale, US, October 2019
	Talk at 61st APS DPP, Fort Lauderdale, US, October 2019
	Talk at Event Horizon Telescope Collaboration Meeting, Nijmegen, The Netherlands, November 2018
	Talk at BlackHoleCam Theory Workshop, Nijmegen, The Netherlands, August 2018
	Talk at ASTRONUM, Panama City Beach, US, June 2018
	Talk at Dutch Astronomers Conference, Groningen, The Netherlands, May 2018
	Talk at CHARM meeting 2017, Brussels, Belgium, March 2017
	Talk at 43rd EPS Plasma Physics conference, Leuven, Belgium, July 2016
	Talk at Dutch Astronomers Conference, Nunspeet, The Netherlands, May 2015
Contributed posters	Poster at Fourth Purdue Workshop on Relativistic Plasma Astrophysics, Purdue, US, May 2020
	Poster at Accretion in Strong Gravity seminar, Bad Honnef, Germany, February 2019
	Poster at Dutch Astronomers Conference, Nunspeet, The Netherlands, May 2016
	Poster at NORDITA summer school on Magnetic Reconnection, Stockholm, Sweden, August 2015
	Poster at 25th Symposium Plasma Physics and Radiation Technology, Lunteren, The Netherlands, March 2013

Collaborators and Advisors

Collaborators	J. Stone (Princeton IAS), R. Keppens, (KU Leuven), O. Porth (University of Amsterdam), L. Sironi (Columbia University), A. Philippov (Flatiron Institute), J. Teunissen (CWI Amsterdam), F. Bacchini (KU Leuven), T. Hertog (KU Leuven), D. Mayerson (Paris-Saclay), B. Vercnocke (KU Leuven), J. Davelaar (Radboud University Nijmegen), E. Most (University of Frankfurt), A. Bhattacharjee (PPPL Princeton), J. TenBarge (PPPL Princeton), J. Juno (Maryland), M. Liska (Harvard), E. Novoselov (Columbia University), A. Bransgrove (Columbia University), J. Nättilä (Columbia University/Flatiron Institute)
Graduate Advisors	R. Keppens, (KU Leuven), G. Lapenta (KU Leuven)
Postdoc Mentors	*A. Philippov (Flatiron Institute/Princeton University), Y. Levin (Flatiron Institute/Columbia University), J. Stone (Princeton University/Institute for Advanced Study)*

References

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Publications

Highlighted papers (first author papers or works I significantly contributed to)

B. Ripperda, F. Bacchini, S. Philippov, *Magnetic reconnection and hot spot formation in black hole accretion disks*, submitted to ApJ (2020), http://arxiv.org/abs/2003.04330

The Event Horizon Telescope Collaboration (**incl. B. Ripperda**), *Verification of radiative transfer schemes for the EHT*, submitted to ApJS (2020)

R. Keppens, Y. Guo, K. Makwana, Z. Mei, **B. Ripperda**, C. Xia, X. Zhao, *MHD instabilities for solar coronal mass ejections: Interacting current channels and particle acceleration*, Rev. Mod. Plasma Phys. (2019), 3, 14, DOI: https://doi.org/10.1007/s41614-019-0035-z

B. Ripperda, F. Bacchini, O. Porth, E.R. Most, H. Olivares, A. Nathanail, L. Rezzolla, J. Teunissen, R. Keppens, *General relativistic resistive magnetohydrodynamics with robust primitive variable recovery for accretion disk simulations,* ApJS, 244, 1 (2019), DOI: https://doi.org/10.3847/1538-4365/ab3922

M. Leroy, **B. Ripperda**, R. Keppens, *Particle orbits at the magnetopause: Kelvin-Helmholtz induced trapping*, J. Geophys. Res. Space Physics (2019), 124, 6715– 6729, https://doi.org/10.1029/2019JA026994

The Event Horizon Telescope Collaboration (**incl. B. Ripperda**), *First M87 Event Horizon Telescope Results. V. Physical origin of the asymmetric ring*, ApJL (2019), 875, L5, DOI: https://doi.org/10.3847/2041-8213/ab0f43

B. Ripperda, O. Porth, L. Sironi, R. Keppens, *Relativistic resistive magnetohydrodynamic reconnection and plasmoid formation in merging flux tubes,* MNRAS (2019), 485, 1, DOI: https://doi.org/10.1093/mnras/stz387

F. Bacchini, **B. Ripperda**, O. Porth, L. Sironi, *Generalized, energy conserving numerical simulations of particles in general relativity. II. Test particles in electromagnetic fields and GRMHD*, ApJS (2019), 240, 2, DOI: https://doi.org/10.3847/1538-4365/aafcb3

F. Bacchini, **B. Ripperda**, A.Y. Chen, L. Sironi, *Generalized, energy conserving numerical simulations of particles in general relativity. I. Time-like and null geodesics*, ApJS (2018), 237, 6, DOI: https://doi.org/10.3847/1538-4365/aac9ca

B. Ripperda, F. Bacchini, J. Teunissen, C. Xia, O. Porth, L. Sironi, G. Lapenta, R. Keppens, *A comprehensive comparison of relativistic particle integrators,* ApJS (2018), 235, 1, DOI: https://doi.org/10.3847/1538-4365/aab114

B. Ripperda, O, Porth, C. Xia, R. Keppens, *Reconnection and particle acceleration in interacting flux ropes - II. Test particles in 3D magnetically dominated plasmas*, MNRAS (2017), 471, 3, DOI: https://doi.org/10.1093/mnras/stx1875

B. Ripperda, O, Porth, C. Xia, R. Keppens, *Reconnection and particle acceleration in interacting flux ropes - I. Magnetohydrodynamics and test particles in 2.5D*, MNRAS (2017), 467, 3, DOI: https://doi.org/10.1093/mnras/stx379

Refereed papers as co-author (large collaboration papers)

The Event Horizon Telescope Collaboration (**incl. B. Ripperda**), *Event Horizon Telescope imaging of the archetypical blazar 3C 279 at extreme 20 microarcsecond resolution*, submitted to A&A (2019)

The Event Horizon Telescope Collaboration (**incl. B. Ripperda**), *Themis: A Parameter*

Estimation Framework for the Event Horizon Telescope, submitted to ApJ (2019)

The Event Horizon Telescope Collaboration (**incl. B. Ripperda**), *SYMBA: An end-to-end VLBI synthetic data generation pipeline. Simulating Event Horizon Telescope observations of M87*, A&A (2019), https://doi.org/10.1051/0004-6361/201936622

The Event Horizon Telescope Collaboration (**incl. B. Ripperda**), *The event horizon general relativistic magnetohydrodynamic code comparison project,* ApJS (2019), 243, 2, https://doi.org/10.3847/1538-4365/ab29fd

The Event Horizon Telescope Collaboration (**incl. B. Ripperda**), *First M87 Event Horizon Telescope Results. I. The shadow of the supermassive black hole*, ApJL (2019), 875, L1, DOI: https://doi.org/10.3847/2041-8213/ab0ec7

The Event Horizon Telescope Collaboration (**incl. B. Ripperda**), *First M87 Event Horizon Telescope Results. II. Array and instrumentation*, ApJL (2019), 875, L2, DOI: https://doi.org/10.3847/2041-8213/ab0c96

The Event Horizon Telescope Collaboration (**incl. B. Ripperda**), *First M87 Event Horizon Telescope Results. III. Data processing and calibration*, ApJL (2019), 875, L3, DOI: https://doi.org/10.3847/2041-8213/ab0c57

The Event Horizon Telescope Collaboration (**incl. B. Ripperda**), *First M87 Event Horizon Telescope Results. IV. Imaging the central supermassive black hole*, ApJL (2019), 875, L4, DOI: https://doi.org/10.3847/2041-8213/ab0e85

The Event Horizon Telescope Collaboration (**incl. B. Ripperda**), *First M87 Event Horizon Telescope Results. VI. The shadow and mass of the central black hole*, ApJL (2019), 875, L6, DOI: https://doi.org/10.3847/2041-8213/ab1141

Refereed conference proceedings

F. Bacchini, **B. Ripperda**, L. Sironi, *Numerical methods for general relativistic particles*, Proceedings of the International Astronomical Union, Symposium 342 (Perseus in Sicily: from black hole to cluster outskirts) (2018), https://arxiv.org/abs/1810.01153

B. Ripperda, O. Porth, R. Keppens, *Test particles in relativistic resistive magnetohydrodynamics,* J. Phys.: Conf. Ser (2019). 1225 012018, DOI: https://doi.org/10.1088/1742-6596/1225/1/012018

B. Ripperda, R. Keppens, O. Porth, *Particle acceleration during explosive reconnection due to tilt instabilities*, Proceedings 43rd EPS Conference on Plasma Physics (Leuven, 4-8 July 2016), http://ocs.ciemat.es/EPS2016PAP/pdf/O4.409.pdf

Doctoral Thesis

B. Ripperda, *On magnetic reconnection and particle acceleration in relativistic plasmas*, PhD thesis, KU Leuven, Department of Mathematics, https://perswww.kuleuven.be/~u0016541/MHD_sheets_pdf/thesisBart.pdf