

# ELIOT AYACHE

Postdoctoral researcher at the  
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Born 01/05/1994, French

## PROFESSIONAL EXPERIENCE

2021 - 2023 **Postdoctoral researcher**, SUMO group, OSKAR KLEIN CENTRE, STOCKHOLM UNIV.

## HIGHER EDUCATION

2017 - 2021 **Ph.D.**, Computational Astrophysics, UNIVERSITY OF BATH  
Thesis title: “*Numerics and Theory of High-Energy Relativistic Astrophysical Transients*”  
Supervisor: Dr. Hendrik van Eerten  
2015 - 2017 **M.Sc.**, Astronomy, Astrophysics and Space Engineering, OBSERVATOIRE DE PARIS, PSL UNIV.  
2013 - 2016 **Diplôme d’ingénieur** (equiv **M.Sc.** Executive Engineering), MINES PARISTECH, PSL UNIV.  
2011 - 2013 **Preparatory classes**, Physics and Chemistry, LYCÉE SAINT-LOUIS, PARIS  
Ranked 79<sup>th</sup> out of 3489 (National “Grandes Ecoles” admission competitive exam)

## STUDENT RESEARCH EXPERIENCE

2017 (Mar-Jun) **Observatoire de Paris, LUTH**  
*Numerical modeling of the dynamics of stratified AGN jets*  
Supervisor: Dr. Zakaria Meliani  
2016 (May-Aug) **Observatoire de Genève, Exoplanets Team**  
*Characterisation of the density and internal structure of low-mass exoplanets*  
Supervisor: Prof. François Bouchy  
2015 (Jun-Sept) **NASA Jet Propulsion Laboratory**  
*Study of high-redshift galaxy clusters in preparation of the Euclid Mission*  
Supervisors: Prof. Simona Mei and Prof. James Bartlett  
2014 (Sept-Feb) **Observatoire de Paris, GEPI**  
*Automatic estimation of galaxy morphology using neural networks*  
Supervisor: Dr. Marc Huertas-Company

## PROFESSIONAL GRANTS

2018	Travel award (DIAS school in high-energy astro), ROYAL ASTRONOMICAL SOCIETY	£450
2017	Fully funded 3.5 years Ph.D. studentship, UNIVERSITY OF BATH	£50,000
•	Computer time	
2020	GW4-Isambard Tier-2 HPC Center, UK	40,000 node-hrs
2022	SNIC Medium allocation (Dardel) – <b>Acting PI</b>	252,000 core-hrs

## AWARDS

2020 Poster Prize 3<sup>rd</sup> place, London Mathematical Society - Bath ML symposium 2020

## SELECTED CONTRIBUTED TALKS AND WORKSHOPS

2022	<b>Intl. Conf. on Machine Learning for Astrophysics – ML4Astro</b> (upcoming) “ <i>An Unsupervised Dive into Gamma-ray Burst Afterglow Classification</i> ”	Catania, Italy
2021	<b>EAS annual meeting</b> Workshop: “ <i>Introduction to Machine Learning for Astrophysics</i> ” Workshop: “ <i>Machine Learning Methods for Astrophysics</i> ”	Online
2020	<b>RAS National Astronomy Meeting</b> (Canceled, re-selected and delivered 2021) Same workshops as above	Online
2020	<b>RAS specialist meeting: Radiation Hydrodynamics</b> “ <i>From Dynamics to radiation: Simulating GRB afterglow flares on a moving mesh</i> ”	London, UK
2019	<b>Yamada conference LXXI: GRBs in the gravitational wave era</b> “ <i>Moving-mesh simulations of GRB afterglow flares</i> ”	Yokohama, Japan
2018	<b>Bath, Bristol, Exeter and Cardiff astrophysics student seminar</b> “ <i>The dynamics of relativistic stratified AGN jets</i> ”	Bath, UK

- Local talks

2021 Stockholm University Astrophysics departmental seminar.  
 2020 Workshop on Monte-Carlo simulations in Astrophysics (Online)  
 2020 Bath department of Physics Theory group meeting

#### SELECTED POSTERS

2021	IAU symposium 363 – Neutron star astrophysics at the Crossroads	Online
2020	RAS Early-Career Poster Exhibition (2 posters)	Online
2020	LMS-Bath symposium 2020: Mathematics of Machine Learning	Online
2019	SKA Meeting: A Centenary of Astrophysical Jets	Jodrell Bank Obs, UK

#### OUTREACH

2019	<b>Pint of Science Talk: “Badly Behaved Gamma-Ray Bursts”</b>	Bath, UK
2019	<b>European Researcher’s Night: walking with scientists</b>	Bath, UK

#### SUPERVISION

2020 – 2021	<b>Rupert Eardley</b> , M.Sc. project student (advisor), UNIVERSITY OF BATH
2019 – 2020	<b>Claire Anderson</b> , B.Sc. project student (primary advisor), UNIVERSITY OF BATH
2019 – 2020	<b>Tara Howard</b> , B.Sc. project student (primary advisor), UNIVERSITY OF BATH
2017 – 2018	<b>Marina Solomou</b> , B.Sc. project student (advisor), UNIVERSITY OF BATH

#### TEACHING

- Lecturing  
 2019 – 2020 2<sup>nd</sup> year Physics: C programming, UNIVERSITY OF BATH
- Demonstrating  
 2019 – 2020 3<sup>rd</sup> year Physics: Computational Astrophysics, UNIVERSITY OF BATH  
 2018 – 2019 3<sup>rd</sup> year Physics: Computational Physics B, UNIVERSITY OF BATH  
 2017 – 2020 2<sup>nd</sup> year Physics: C programming, UNIVERSITY OF BATH

#### PROFESSIONAL MEMBERSHIP

2017 – 2021 Fellow of the Royal Astronomical Society

#### OBSERVING EXPERIENCE

Radial velocity measurements: HARPS, la Silla ESO, Chile  
 SOPHIE, Observatoire de Haute-Provence, France  
 Co-Investigator of radio observing proposals for GRB follow-up, UNIVERSITY OF BATH

#### COMPUTING, PROGRAMMING AND DATA ANALYSIS

Languages: C/C++, Fortran, Python, Bash, Java, HTML5/CSS  
 Packages: OpenMP, MPI, HDF5, Scikit-Learn, Tensorflow, PyTorch  
 Software: Git, SAOImage DS9, Topcat, ParaView  
 Technical experience: Numerical modeling (PDEs, finite-volumes, Monte-Carlo methods), Bayesian statistics (MCMC), neural networks, high-performance computing, Gaussian processes

#### LANGUAGES

French: Mother tongue	English: Fluent (TOEFL iBT 112/120)	Spanish: Intermediate
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#### PUBLICATIONS

2 refereed, incl. 2 first author  
 2 non-refereed (Proceedings), 2 in prep.

1. **Ayache, E. H.**, Van Eerten, H. J., Daigne, F. (2020), [MNRAS, 495, 2979-2993](#)  
 Late X-ray flares from the interaction of a reverse shock with a stratified ejecta in GRB afterglows: simulations on a moving mesh.
2. **Ayache, E. H.**, Van Eerten, H. J., Eardley, R. W. (2022), [MNRAS, 510, 1315-1330](#)  
 GAMMA: a new method for modelling relativistic hydrodynamics and non-thermal emission on a moving mesh.