

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 79th 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) – Acting PI	252,000 core-hrs

AWARDS

2020 Poster Prize 3rd place, London Mathematical Society - Bath ML symposium 2020

SELECTED CONTRIBUTED TALKS AND WORKSHOPS

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

SUPERVISION

May – Aug 2022	Lucas Barrault , M.Sc. project student (primary advisor), ESPCI, Paris
2020 – 2021	Rupert Eardley , M.Sc. project student (advisor), UNIVERSITY OF BATH
2019 – 2020	Claire Anderson , B.Sc. project student (primary advisor), UNIVERSITY OF BATH
2019 – 2020	Tara Howard , B.Sc. project student (primary advisor), UNIVERSITY OF BATH
2017 – 2018	Marina Solomou , B.Sc. project student (advisor), UNIVERSITY OF BATH

TEACHING

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

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

- 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.
3. Laskar, T., Alexander, K., Margutti, R., et al. (**Ayache, E. H.** 12th author, accepted for publication in ApJL)
[ArXiv: 2302.04388](#)
The Radio to GeV Afterglow of GRB 221009A