Fruzsina Julia Agocs — Curriculum Vitae

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arXiv

Research interests

Numerical Analysis
PDEs
Boundary integral equations
ODEs
High-order methods
Oscillatory problems
Wave propagation
Computational cosmology, physics
Open-source software

Education

Ph.D. 2021, Theoretical Cosmology, University of Cambridge, UK.
Advisor: Anthony Lasenby, Mike Hobson, Will Handley
Thesis: Primordial evolution of cosmological perturbations: Theory and computation

M.Sci. 2017, Theoretical and Experimental Physics, University of Cambridge, UK.
Advisor: Will Handley, First class
Dissertation: The Runge-Kutta-Wentzel-Kramers-Brillouin method and the primordial Universe

B.A. 2016, Natural Sciences, University of Cambridge, UK.
First class

Professional experience

Oct 2021–present, Flatiron Research Fellow, Center for Computational Mathematics, Flatiron Institute, New York, USA

Jul 2019– Jan 2020, Research student, British Antarctic Survey, UK
Forecasting Arctic sea ice extent with temporal convolutional networks
Advisor: Scott Hosking

Jul–Sept 2016 & Jul–Aug 2017, Research Engineer, Kokoon Technology Ltd., UK
Sleep cycle classification based on single-channel EEG data

Jun–Sept 2015, Research student, Institute of Astronomy, University of Cambridge, UK
Correcting for host galaxy contamination in the spectral energy distribution of active galactic nuclei
Advisor: Ranjan Vasudevan

Publications

Refereed: 7 articles (5 first author)
Citations 73
h-index: 5
(as of *2023-10-30*)

Refereed

7 **Agocs, F. J.**; Barnett, A. H., *An adaptive spectral method for oscillatory second-order linear ODEs with frequency-independent cost*, to appear in SIAM Numerical Analysis, 2022 (arXiv:2212.06924)

6 **Agocs, F. J.**; Barnett, A., *riccati: an adaptive, spectral solver for oscillatory ODEs*, JOSS, **8**, 5430, 2023

5 Hergt, L. T.; **Agocs, F. J.**; Handley, W. J.; Hobson, M. P. *et al.*, *Finite inflation in curved space*, Physical Review D, **106**, 63529, 2022 (arXiv:2205.07374) [9 citations]

4 AbdusSalam, S. S.; **Agocs, F. J.**; Allanach, B. C.; Athron, P. *et al.*, *Simple and statistically sound recommendations for analysing physical theories*, Reports on Progress in Physics, **85**, 52201, 2022 (arXiv:2012.09874) [15 citations]

3 **Agocs, F. J.**, *(py)oscode: fast solutions of oscillatory ODEs*, JOSS, **5**, 2830, 2020 [2 citations]

2 **Agocs, F. J.**; Hergt, L. T.; Handley, W. J.; Lasenby, A. N. *et al.*, *Quantum initial conditions for inflation and canonical invariance*, Physical Review D, **102**, 23507, 2020 (arXiv:2002.07042) [10 citations]

1 **Agocs, F. J.**; Handley, W. J.; Lasenby, A. N.; Hobson, M. P., *Efficient method for solving highly oscillatory ordinary differential equations with applications to physical systems*, Physical Review Research, **2**, 13030, 2020 (arXiv:1906.01421) [30 citations]

Preprints & other

3 **Agocs, F. J.**; Barnett, A. H., *Trapped acoustic waves and raindrops: high-order accurate integral equation method for localized excitation of a periodic staircase*, submitted to Journal of Computational Physics, 2023 (arXiv:2310.12486)

2 Letey, M. I.; Shumaylov, Z.; **Agocs, F. J.**; Handley, W. J. *et al.*, *Quantum Initial Conditions for Curved Inflating Universes*, submitted to Physical Review D, 2022 (arXiv:2211.17248) [2 citations]

1 **Agocs, F. J.**; Hobson, M. P.; Handley, W. J.; Lasenby, A. N., *Dense output for highly oscillatory numerical solutions*, submitted to Physical Review Research, 2020 (arXiv:2007.05013) [4 citations]

Google scholar

Honors and awards

2017–2021, STFC funded PhD award

2017, Duncan Bruce memorial prize for excellence in physics

2016, Senior scholarship for academic excellence

Talks

Nov 2023, University of Massachusetts Lowell (invited seminar)
Oct 2023, SIAM-NNP, Newark (minisymposium, organizer)
Oct 2023, Cornell (invited talk)
Aug 2023, ICIAM, Tokyo (contributed talk)
Aug 2023, ICOSAHOM, Seoul (minisymposium)
Apr 2023, NYU, New York (invited seminar)
Feb 2023, SIAM Computer Science and Engineering, Amsterdam (minisymposium, organizer)
Feb 2023, Yale (invited seminar)
Dec 2022, University of Innsbruck (invited seminar)
Oct 2022, Flatiron-wide algorithms and mathematics ($F_\omega(\alpha+m)$!), New York (lecture)
Oct 2022, University of Chicago (invited seminar)
Oct 2022, New Jersey Institute of Technology (invited seminar)
Sept 2022, Sayas numerics day, University of Maryland, BC (contributed talk)
Jun 2022, SDIDE, Budapest (invited speaker)
May 2022, BIRS-CMO workshop on "Outstanding challenges in computational methods for integral equations", virtual (invited speaker)
Jan 2021, CAM-LMU workshop, virtual (contributed talk)
Nov 2020, Numerical analysis seminar, Flatiron Institute, New York
July 2020, Beecroft Institute, University of Oxford (seminar)
July 2020, SciPy conference, virtual (contributed talk)
Apr 2020, Battcock Centre for Experimental Astrophysics, Cambridge (invited seminar)
Jan 2020, Institute of Astronomy, Cambridge (invited seminar)
Sept 2019, KICC10, Kavli Institute of Cosmology, Cambridge (contributed talk & poster)
Oct 2018, Kavli Institute of Cosmology, Cambridge (invited seminar)
Jul 2018, National CDT in data intensive science conference, London (poster)
Jun 2017, Battcock Centre for Experimental Astrophysics, Cambridge (invited seminar)

Open source development

Core developer of riccati, oscode
Member of "core team" of GAMBIT

Teaching and mentoring

2023, Co-mentoring Master's student Sankalan Bhattacharyya, University of Cambridge
Applications of spectral collocation methods in cosmology simulations

Tutorials in groups of 2-20, University of Cambridge:
2018–2019, 1st year Mathematics *(6 students, 56 hours total)*
2017–2019, 3rd year General Relativity *(11 students, 11 hours total)*
2017–2020, 4th year Relativistic Astrophysics and Cosmology *(50 students, 28 hours total)*

Workshop and meeting organization

Oct 2023, SIAM regional meeting, minisymposium on "Advances in integral equations and quadrature methods, and their applications in computational physics"

Feb 2023, SIAM Computer Science and Engineering, minisymposium on "Software for integral equations and boundary element methods"

Public outreach (selected)

2020, Public talk at the Open Evening of the Institute of Astronomy, Cambridge

2020, Astronomy lecture and observation session at Logikatábor, Hungary

2020, Interview for article on meteor showers

2020, Periscope broadcast at RWTH Aachen University

2018, Invited speaker at the Women in STEM residential, Gonville and Caius college

Professional services & activities

Referee: Journal of Open Source Software, SIAM Numerical Analysis, SciPy

Member: GAMBIT collaboration

References

Alex Barnett, Center for Computational Mathematics, Flatiron Institute
abarnett@flatironinstitute.org

Leslie Greengard, Center for Computational Mathematics, Flatiron Institute
lgreengard@flatironinstitute.org

Mike Hobson, University of Cambridge (UK)
mph@mrao.cam.ac.uk

Teaching:
Marsha Berger, Center for Computational Mathematics, Flatiron Institute
mberger@flatironinstitute.org