

# Nicholas Choustikov

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*Nationality:* British, New Zealander

📍 Denys Wilkinson Building, Keble Road, Oxford, OX1 3RH



## Interests

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Galaxy formation and evolution, reionization, AGN feedback, simulation forward modelling, spectral modelling, black holes, magnetohydrodynamics, machine learning methods, large-scale structure, and cosmology

## Education

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**Visiting Student Research Collaborator**

*Supervisor:* Professor Romain Teyssier

Princeton University

April 2024 - August 2024

**DPhil in Astrophysics**

*PhD program*

Oriel College, University of Oxford

October 2022 - Present

*Supervisors:* Professor Julien Devriendt and Professor Adrienne Slyz

*Thesis title:* The impact of magnetic fields on gas accretion onto supermassive black holes and AGN feedback: the next frontier of galaxy formation cosmological simulations

**BA + MSci in Natural Sciences**

*Undergraduate program*

Fitzwilliam College, University of Cambridge

October 2018 - July 2022

*Grade:* Double First Class with Distinction (85%)

*Masters Supervisors:* Dr Zvonimir Vlah and Professor Anthony Challinor

*Courses:* Astrophysical Fluid Dynamics, General Relativity, Black Holes, Galaxy Formation, Cosmology, Modern Stellar Dynamics, Quantum Field Theory, Field Theory in Cosmology

## First-Author Papers

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**Inferring the Ionizing Photon Contributions of High-Redshift Galaxies to Reionization with JWST NIRCам Photometry** 2024

*Nicholas Choustikov, Richard Stiskalek, Aayush Saxena, Harley Katz, Julien Devriendt, and Adrienne Slyz*

*Submitted to MNRAS*



**The Great Escape: On the Connection Between Ly $\alpha$  Emission and LyC Escape in Simulated JWST Analogues** 2024

*Nicholas Choustikov, Harley Katz, Aayush Saxena, Thibault Garel, Julien Devriendt, Adrienne Slyz, Taysun Kimm, Jeremy Blaizot, and Joki Rosdahl*

*Submitted to MNRAS*



**The Physics of Indirect Estimators of Lyman Continuum Escape and their Application to High-Redshift JWST Galaxies** 2024

*Nicholas Choustikov, Harley Katz, Aayush Saxena, Alex Cameron, Julien Devriendt, Adrienne Slyz, Joki Rosdahl, Jeremy Blaizot, and Leo Michel-Dansac*

*Published in MNRAS*



**Optimizing the Evolution of Perturbations in the  $\Lambda$ CDM Universe** 2023



*Nicholas Choustikov, Zvonimir Vlah, and Anthony Challinor*

*Published in Phys. Rev. D*



## Contributed Papers

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- The Sizes of Bright Lyman-break Galaxies at  $z \simeq 3 - 5$  with JWST PRIMER** 2024  
*Rohan Varadaraj, Rebecca Bowler, Matt Jarvis, Nathan Adams, **Nicholas Choustikov**, Anton Koekemoer, Adam Carnall, Derek McLeod, James Dunlop, Callum Donnan, and Norman Grogin*   
*Submitted to MNRAS*
- The Sphinx Public Data Release: Forward Modelling High-Redshift JWST Observations with Cosmological Radiation Hydrodynamics Simulations** 2023  
*Harley Katz, Joki Rosdahl, Tayun Kimm, Jeremy Blaizot, **Nicholas Choustikov**, Marion Farcy, Thibault Garel, Martin Haehnelt, Leo Michel-Dansac, and Pierre Ocvirk*   
*Published in the Open Journal*

## Tutorials & Reviews

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- The Einstein Toolkit: A Student's Guide** 2020  
*Nicholas Choustikov* 

## Academic Internships

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- Kavli Institute for Cosmology, University of Cambridge** Summer 2022  
*Project: Loop-order corrections to the dark matter power spectrum with quintessence dark energy*  
*Supervisors: Dr Zvonimir Vlah and Professor Anthony Challinor*
- Mullard Space Science Laboratory, University College London** Summer 2021  
*Project: Simulating QCD phase transitions in binary neutron star mergers*  
*Supervisor: Professor Kinwah Wu*
- Cavendish Laboratory, University of Cambridge** Summer 2019  
*Project: Designing and building a long-lasting millisecond optical shutter*  
*Supervisors: Dr Timon Hilker and Professor Zoran Hadzibabic*

## Teaching

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- CP1: Classical Mechanics** 2023 - present  
*1st year undergraduate tutorials at Oriel College, Oxford*
- A3: Quantum Mechanics** 2023 - present  
*2nd year undergraduate tutorials at Oriel College, Oxford*
- B2: Symmetry and Relativity** 2023 - present  
*3rd year undergraduate tutorials at Oriel College, Oxford*

## Student Supervision

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- Tongyu Sun (MPhys)** 2023-2024  
*Stellar Mass Estimation for High-Redshift Galaxies Using Machine Learning*

## Awards and Societies

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- STFC Long Term Attachment Grant** 2024  
*Funding for a 5 month research attachment to Princeton with Professor Romain Teyssier*
- Graduate Teaching and Research Scholarship - Oriel College** 2023 - present  
*Research funding in exchange for teaching undergraduate physics students at Oriel College*
- STFC PhD Stipend** 2022 - 2026  
*Full PhD stipend plus course fees for 3.5 years*

<b>1912 Senior Scholarship + Foundation Scholarship</b>	2022
<i>Award for achieving a first class result in each year of the undergraduate course</i>	
<b>Ronald Walker Scholarship + Rawlins Prize</b>	2021
<i>Award for best computational project</i>	
<b>Elected Fellow of the Royal Astronomical Society (FRAS)</b>	2020

### *Technical skills*

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<b>Programming Languages</b>	Python, Mathematica, Fortran, Bash, MATLAB, L <sup>A</sup> T <sub>E</sub> X, MPI parallel programming
<b>Software/Tools</b>	RAMSES, Simulation Based Inference, Einstein Toolkit, High-Performance Computing, git, pynbody, yt, VisIT, Microsoft Office
<b>Other</b>	Trained to operate class 3B & 4 lasers, proficient solderer
<b>Languages</b>	English ( <i>native</i> ), Russian ( <i>fluent</i> ), French ( <i>intermediate</i> ), German ( <i>basic</i> )

### *Selected Talks*

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<b>3. RAMSES User Meeting - Center for Computational Astrophysics</b>	2024
<i>Talk: Using Simulation Based Inference to Predict the Ionizing Output of Galaxies in Reionization</i>	
<b>2. National Astronomy Meeting - Cardiff University</b>	2023
<i>Talk: The Physics of Lyman Continuum Escape from High-Redshift JWST Galaxies</i>	
<b>1. RAMSES User Meeting - University of Oxford (LOC)</b>	2023
<i>Talk: Towards a General Framework of LyC Escape Fraction Diagnostics</i>	