DR. CHRISTIAN PEDERSEN

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RESEARCH INTERESTS

Neutrino cosmology, cosmological constraints from the Lyman-α forest, joint analysis of cosmological probes, hydrodynamical simulations, applications of machine learning techniques to cosmology, gravitational wave astronomy

EXPERIENCE

New York University September 2021 - present
Postdoctoral Associate
Topics: Applications of statistical techniques and deep learning to challenges in astrophysics, working with Prof. Shirley Ho

Centre for Computational Astrophysics September 2021 - present
Guest Researcher

EDUCATION

University College London September 2017 - August 2021
Ph.D. in Astrophysics
Thesis title: Neutrino mass and cosmology from the Lyman-α forest
Supervisors: Dr. Andreu Font-Ribera, Prof. Ofer Lahav, Prof. Thomas D. Kitching
Examiners: Prof. Julien Lesgourgues, Prof. Richard Ellis

Cardiff University September 2012 - July 2017
MPhys in Physics with Astronomy, 1:1
Thesis title: Gravitational waves from colliding black holes
Supervisor: Prof. Stephen Fairhurst

Swansea University September 2009 - July 2012
BA in Classics, 2:2

GRANTS AND AWARDS

Visiting Scholars Program - Fermilab May 2021
Small-scale clustering from eBOSS Lyα forests: PI, $\$\mathbf{10,000}$

CASPEN exchange programme - Oskar Klein Centre for Cosmoparticle Physics May 2019

Constraining inflation and neutrino masses with the Dark March 2019 - March 2020
Energy Spectroscopic Instrument at DiRAC Cambridge: Co-PI, **4.5M CPUh**

Modelling of neutrino masses in the Dark Energy March 2018 - March 2019
Spectroscopic Instrument at DiRAC Cambridge: Co-PI, **0.5M CPUh**

CUROP Research Internship - Cardiff University June 2016 - August 2016
Topic: Perturbation theory in electrodynamics

RISE Research Internship - Karlsruhe Institute of Technology May 2015 - August 2015
Topic: Ultra-high energy cosmic rays at the Pierre Auger observatory

TECHNICAL SKILLS

Computational skills	Python, Linux/Bash, C/C++, git, LaTeX, High Performance Computing (OpenMP, MPI)
Statistical skills	Bayesian Inference, Markov-Chain Monte Carlo Simulations, Machine Learning (Gaussian Processes, Deep Learning)
Software development	LaCE (Developer), cup1d (Developer), MP-Gadget (Contributor), fake_spectra (Contributor)

PUBLICATIONS

Excluding collaboration papers - full list available at available here

- J. J. Givans, A. Font-Ribera, A. Slosar, L. Seeyave, **C. Pedersen**, K. K. Rogers, M. Garny, D. Blas, V. Iršič
  Non-linearities in the Lyman-α forest and in its cross-correlation with dark matter halos, https://arxiv.org/abs/2205.00962
- T. Crossland, P. Stenetorp, D. Kawata, S. Riedel, T. D. Kitching, A. Deshpande, T. Kimpson, C. L. Liew-Cain, **C. Pedersen**, D. Piras, M. Sharma
  Towards Machine Learning-Based Meta-Studies: Applications to Cosmological Parameters, https://arxiv.org/abs/2107.00665
- **C. Pedersen**, A. Font-Ribera, K. K. Rogers, P. McDonald, H. V. Peiris, A. Pontzen, A. Slosar
  An emulator for the Lyman-α forest in beyond-ΛCDM cosmologies, JCAP 2021 (2021) 033
- S. Bird, Y. Feng, **C. Pedersen**, A. Font-Ribera
  More accurate simulations with separate initial conditions for baryons and dark matter, JCAP 2020 (2020) 002
- **C. Pedersen**, A. Font-Ribera, T. D. Kitching, P. McDonald, S. Bird, A. Slosar, K. K. Rogers, A. Pontzen
  Massive neutrinos and degeneracies in Lyman-alpha forest simulations, JCAP 2020 (2020) 025
- M. P. Rey, A. Pontzen, O. Agertz, M. D. A. Orkney, J. I. Read, A. Saintonge, **C. Pedersen**
  EDGE: The origin of scatter in ultra-faint dwarf stellar masses and surface brightnesses, ApJL 886 L3 (2019)

DEPARTMENTAL AND ACADEMIC DUTIES

Referee for *The Astrophysical Journal*	since August 2020
Peer mentor for incoming PhD students	September 2018 - June 2019
UCL Cosmology journal club organiser	September 2018 - June 2020
Teaching assistant for module *Practical Physics & Computing*	September 2017 - December 2019

TALKS

DESI virtual collaboration meeting - Lya session talk	June 2021
Cosmology seminar, UC Riverside	January 2021
Cosmology X Data Science group meeting talk, Flatiron Institute	December 2020
DESI virtual Lyman-α forest meeting	July 2020

DESI-AI forum — June 2020

DESI virtual collaboration meeting - Lya session talk — March 2020

UCL lunch talk — November 2019

DESI collaboration meeting, Berkeley Lab — July 2019

Cosmology seminar, Oskar Klein Centre for Cosmoparticle Physics — May 2019

IGM 2018 at Kavli IPMU Tokyo — September 2018

Neutrinos@UCL Workshop — June 2018

Astro group meeting talk, Mullard Space Science Laboratory — April 2018

DESI France meeting — January 2018

OUTREACH

Bounce Back Project — Nov 2019
Prepared for material for a presentation on black holes for inmates at Brixton Prison

UCL Physics summer school — July 2018
Mentor at a week long summer school for high school students, supervised experiments using spectrographs and diffraction gratings

Kathleen Lonsdale Building opening day — March 2018
Presentation on cosmoparticle physics with a cloud chamber demonstration to several groups of VIPs, including Sir David Attenborough

REFERENCES

Prof. Shirley Ho, *Flatiron Institute, New York* - shirleyho@flatironinstitute.org
Dr. Andreu Font-Ribera, *Institut de Fisica d'Altes Energies, Barcelona* - afont@ifae.es
Prof. Nickolay Gnedin, *Fermilab, Illinois* - gnedin@fnal.gov
Dr. Michael Eickenberg, *Flatiron Institute, New York* - meickenberg@flatironinstitute.org