Dr Natalia Porqueres

Beecroft fellow
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FIELDS OF EXPERTISE

Data analysis: statistical analysis of large data sets, simulation-based inference, Bayesian analysis.
Cosmology: weak lensing, Lyman-α forest, galaxy clustering, foregrounds and contaminations.
Structure formation: reconstruction of the matter density, structure formation models.
High-performance computing: inference of high-dimensional problems, OpenMP, MPI.

EMPLOYMENT

1/10/2022–date	**Beecroft fellow** Beecroft Institute, University of Oxford
1/10/2019–30/09/2022	**Postdoctoral Research Associate** Imperial Centre for Inference and Cosmology (ICIC), Imperial College
1/09/2016–30/09/2019	**PhD student, IMPRS fellow** Max Planck Institute for Astrophysics and Excellence Cluster Universe
1/06/2015–30/08/2015	**Internship with DAAD Short-term grant** Max Planck Institute for Astrophysics

EDUCATION

16/09/2019	**Dr. rer. nat., Astrophysics, Ludwig Maximilian University of Munich** Thesis: Inferring the growth of structures from Lyman-α forest data Magna cum laude
06/07/2016	**MSc in Astrophysics and Cosmology, University of Barcelona** Cumulative Point Average (CPA) = 94%
30/07/2015	**BSc in Physics, University of Barcelona** Cumulative Point Average (CPA) = 83%

AWARDS AND HONORS

2023 Junior Research fellowship, Wolfson College
2022 Beecroft fellowship, University of Oxford
2022 Seal of Excellence, European Commission, Marie Skłodowska-Curie Actions
2022 Maria Zambrano Postdoctoral Fellowship at UAB (declined)
2019 International Max Planck Research School (IMPRS) certificate.
2016 Herta-Sponer PhD Studentship, Excellence Cluster Universe and Max Planck Institute for Astrophysics.
2015 Research Scholarship - Short-Term Grant from German Academic Exchange Service (DAAD), Max Planck Institute for Astrophysics.
2015 La Pedrera - Institut de Ciències del Cosmos scholarship, University of Barcelona.

ACADEMIC LEADERSHIP

Elected council member and nominated **vice-president** of the International Astrostatistics Association.
LSST-DESC: **Project lead** in Bayesian pipelines topical team.
Euclid Consortium: **Scientific editor** in the Editorial Board (ECEB).
Aquila Consortium: **Lead** of weak lensing analysis.

LECTURING

2023 **Lecturer** at Data Analysis School for PhD students (3 of 8 lectures), Imperial College London.
2023 **Lecturer** of Modern Astrostatistics (compulsory 3ECTS master course with exam), Excellent teaching evaluation: 8.4, Leiden University.
2022 **Lecturer** at Data Analysis School for PhD students (1 lecture and coordination of hands-on sessions), Imperial College London.

SUPERVISION

2023 **MSc student** Konstantin Dukats, University of Oxford.
2023 **MSc student** Anya Paopiamsap (co-supervisor with D. Alonso), University of Oxford.
2023 **BSc student** Iason Saganas (co-supervisor with T. Enßlin), MPA.
2021 **PhD student** Lucas Makinen (co-supervisor with A. Heavens), Imperial College.

TUTORING

2022 **Tutor** Astrophysics course (4th year students), University of Oxford.
2021 **Demonstrator** hands-on sessions at Data Analysis School, Imperial College.
2020 **Demonstrator** Electromagnetism and Optics Lab (1st year students), Imperial College.

SELECTED TALKS FROM A TOTAL OF 24 INVITED TALKS

2023 "Current challenges for cosmology" conference, Bucaramanga
2023 "New strategies for extracting cosmology" conference, Sexten
2023 "Perspective on LSS" conference, Prague
2023 "Cosmology with large scale structure" conference, DIPC
2022 "Advances in cosmology through numerical simulations" workshop, Munich
2022 "Likelihood-free inference in Paris" conference, École Normale Supérieure
2022 "Weak lensing beyond 2 point" conference, Kyoto University (remote)
2021 Euclid Galaxy Clustering - Additional probes working group
2020 "The Cosmic Web in the Local Universe" conference, Lorentz Center
2020 U. of Arizona, Cosmology seminar (remote)

COMMITTEE INVOLVEMENT

Trained anti-harassment advisor at University of Oxford (since March 2023)
Postdoc representative at the Aquila Equality & Diversity committee (since March 2022)
Representative of Imperial College at the London Institute of Cosmology (2021-2022)
Elected member of the Aquila Consortium Editorial Advisory Group (2020-2021)
Referee MNRAS, A&A, JCAP, ApJ.

ORGANISATION OF ACADEMIC EVENTS

Cosmology Seminar, University of Oxford (since 2023)
Biannual Aquila Meeting in Oxford (2023)
STFC-funded Data Analysis School at Imperial College (Sep. 2023, Sep. 2022 and Sep. 2021)
Monthly London Cosmology Discussion Meeting (LCDM) (2021-2022)
Euclid:UK meeting (Dec. 2019)

PUBLIC ENGAGEMENT

2023 Cosmology talk and telescope observation, Wolfson College.
2022 Co-organiser of the AstroClub at Wolfson College.
2020 Cosmology talk at Featherstone High School (Ealing, London).
2018 Supervision of intern high-school students at the Max Planck Institute for Astrophysics.
2018 Talk for high-school students at the Excellence Cluster Universe.

PUBLICATION LIST

Since the start of my PhD in Sep. 2016, I have authored a total of 13 papers, 8 of which as a first author and 2 led by students I co-supervise (underlined below), with a total of 196 citations (h-index of 9).

1. "Accuracy requirements on intrinsic alignments for Stage-IV cosmic shear ",
   A. Paopiamsap, **N. Porqueres**, D. Alonso, J. Harnois-Deraps, D. Leonard
   (Submitted to *OJA*) (arXiv:2311.16812)

2. "DISCO-DJ I: a differentiable Einstein-Boltzmann solver for cosmology ",
   O. Hahn, F. List, **N. Porqueres**
   (Submitted to *JCAP*) (arXiv:2311.03291)

3. "Field-level inference of cosmic shear with intrinsic alignments and baryons",
   N. Porqueres, A. Heavens, D. Mortlock, G. Lavaux, T. Makinen
   (Submitted to *MNRAS*) (arXiv:2304.04785)

4. "LyAl-Net: A high-efficiency Lyman-α forest simulation with a neural network",
   C. Boonkongkird, G. Lavaux, S. Peirani, Y. Dubois, **N. Porqueres**, E. Tsaprazi
   (Submitted to *A&A*) (arXiv:2303.17939)

5. "The Cosmic Graph: Optimal Information Extraction from Large-Scale Structure using Catalogs",
   T. L. Makinen, T. Charnock, P. Lemos, **N. Porqueres**, A. Heavens, B. Wandelt
   (*Open Journal of Astrophysics*, 2022) (arXiv:2207.05202)

6. "Lifting weak lensing degeneracies with a field-based likelihood",
   N. Porqueres, A. Heavens, D. Mortlock, G. Lavaux
   (*Monthly Notices of the Royal Astronomical Society*, 2021) (arXiv:2108.04825)

7. "Bayesian forward modelling of cosmic shear data",
   N. Porqueres, A. Heavens, D. Mortlock, G. Lavaux
   (*Monthly Notices of the Royal Astronomical Society*, 2021) (arXiv:2011.07722)

8. "A hierarchical field-level inference approach to reconstruction from Lyman-α forest data",
   N. Porqueres, O. Hahn, J. Jasche, G. Lavaux
   (*Astronomy & Astrophysics*, 2020) (arXiv:2005.12928)

9. "Inferring high redshift large-scale structure dynamics from the Lyman-alpha forest",
   N. Porqueres, J. Jasche, G. Lavaux, T. Enßlin
   (*Astronomy & Astrophysics*, 2019) (arXiv:1907.02973)

10. "Explicit Bayesian treatment of unknown foreground contaminations in galaxy surveys",
    N. Porqueres, D. Kodi Ramanah, J. Jasche, G. Lavaux
    (*Astronomy & Astrophysics*, 2019) (arXiv:1812.05113)

11. "Imprints of the large-scale structure on AGN formation and evolution",
    N. Porqueres, J. Jasche, T. Enßlin, G. Lavaux
    (*Astronomy & Astrophysics*, 2018) (arXiv:1710.07641)

12. "NIFTy 3 - Numerical Information Field Theory",
    T. Steininger, J. Dixit, P. Frank, M. Greiner, S. Hutschenreuter, J. Knollmüller, R. Leike, **N. Porqueres**, D. Pumpe, M. Reinecke, M. Sraml, C. Varady, T. Enßlin
    (*Annalen der Physik*, 2019) (arXiv:1708.01073)

13. "Cosmic expansion history from SNe Ia data via information field theory",
    N. Porqueres, T. Enßlin, M. Greiner, V. Böhm, S. Dorn, P. Ruiz-Lapuente, A. Manrique
    (*Astronomy & Astrophysics*, 2017) (arXiv:1608.04007)