NASA Einstein Fellow, Center for Cosmology & Particle Physics, New York University
Contact: boris.leistedt@nyu.edu Homepage: http://www.ixkael.com Software: github.com/ixkael

RESEARCH INTERESTS & VISION

I work at the interface of observational cosmology and statistics: I seek to test and refine models of the formation and evolution of our universe and the populations of galaxies it contains by mining systematics-limited billion-object surveys of the night sky (DES, LSST, DESI, Euclid). I specialize in the use of rigorous data analysis techniques combining causal physical models and machine learning. I also work on stellar surveys (Gaia) to study stellar populations in our own Galaxy, and I am passionate about teaching data analysis and statistics to astronomers.

CURRENT AND PAST POSITIONS

NYU – New York University (USA), Center for Cosmology & Particle Physics. since 2015
Research fellow (Simons Foundation Fellow then NASA Einstein Fellow).

UCL – University College London (UK), Department of Physics & Astronomy. 2014 – 2015
Postdoctoral researcher.

EDUCATION

UCL – University College London (UK) 2011 – 2014
Doctor of Philosophy (PhD) in Physics & Astronomy. Advisor: Hiranya Peiris.

Mons University (Belgium) and Supélec (École Supérieure d'Électricité, Paris, France) 2006 – 2011
Joint Diplôme d'Ingénieur (dual MSc Electrical Engineering / Computer Science).

Paris 11 – Orsay Paris-Sud University (France) 2008 – 2011
Master de Physique Fondamentale (MSc Physics, joint with engineering degree).

AWARDS

NASA Einstein Research Fellowship (3-year national physics fellowship)	2016 – 2019
Simons Foundation Research Fellowship (3-year interdisciplinary fellowship)	2015 – 2016
UCL Jon Darius Memorial Prize (outstanding PhD research in astrophysics)	2015
RAS Michael Penston Prize (runner-up, best UK PhD thesis in astrophysics)	2014
ORBEL award finalist (best MSc thesis in operational research in Belgium)	2011
High Octane award (top of MSc class), Faculty of Engineering, University of Mons	2011
T.I.M.E. scholarship held at UMons/Supélec/Paris 11 (exchange program between top European engineering universities leading to a joint MSc degree)	2008 – 2011

ORGANISATION OF WORKSHOPS

Lead organiser of *AstroHackWeek* 2019 @ Kavli Institute for Cosmology (Cambridge UK)	Sept 2019
Lead organiser of *AstroHackWeek* 2018 @ Lorentz Center (Leiden, Netherlands)	Aug 2018
Co-organiser of the interdisciplinary *Biomedical and Astronomical Signal Processing (BASP) Frontiers workshops* (2013, 2015, 2017)	since 2013
Co-organiser of interdisciplinary weekly meetings at the Flatiron Institute CCA.	2016–2018
Co-organiser of the *Cross-correlating cosmic probes* conference in UCL.	June 2014

ACADEMIC SERVICE

Full member of the LSST Dark Energy Science Collaboration.	since 2016
Member of the Dark Energy Survey (with full individual data-rights).	since 2014
Referee for ApJ, JCAP, MNRAS, RSPA, JOSA.	since 2014

TEACHING

Lecturer (astrostatistics and cosmology, 4h) at the CosmoAndes School (Chile).	Jan 2018
Lecturer (astrostatistics, 4h) at the TIARA Summer school (Taiwan).	Sept 2017
Lecturer (Bayesian statistics, 1h) at the AstroHackWeek 2017 (Seattle).	August 2017
Guest lecturer at D. Hogg's and M. Blanton's Physics courses at NYU (1st & 3rd year).	2015-2017

CO-ADVISING AND MENTORING OF STUDENTS

Constance Mahony (PhD student, UCL), main advisor on 1 paper.	since 2018
Axel Widmark (PhD student, Stockholm), main advisor on 2 papers (1 in prep).	since 2017
Keir K. Rogers (PhD student, UCL), co-advisor on 2 published papers.	2014–2017
Jenifer Chan (PhD student, UCL MSSL), co-advisor on 1 code & paper.	2014–2015
Martin Büttner (MSc student, UCL), co-advisor on 1 code & paper.	2013–2015

PUBLIC CODES (main author only, see github.com/ixkael for full list)

`Starlight`	Joint inference of stellar colors and distances via hierarchical models.
`Delight`	Photo-z's and latent galaxy SEDs via Gaussian Processes and hierarchical models.
`QuickSip`	Quickly weight & project galaxy Survey Image Properties (e.g. seeing) into sky maps.
`S2let`	2D spherical spin directional wavelets, curvelets, and ridgelets on the sphere.
`Flag` (`let`)	3D Fourier-Laguerre harmonic transforms and 3D spherical wavelets.

REFERENCES

Hiranya Peiris – h.peiris@ucl.ac.uk
Director, Oskar Klein Centre for Cosmoparticle Physics, Stockholm, Sweden
Professor, Dept of Physics & Astronomy, University College London, UK

David Hogg – david.hogg@nyu.edu
Professor, Center for Cosmology and Particle Physics, New York University, USA
Group Leader, Center for Computational Astrophysics, Flatiron Institute, New York University, USA

Alan Heavens – a.heavens@imperial.ac.uk
Director, Imperial Centre for Inference and Cosmology, Imperial College London, UK
Chair in Astrostatistics, Department of Physics, Imperial College London, UK

Risa Wechsler – rwechsler@stanford.edu
Director, Kavli Institute for Particle Astrophysics and Cosmology, Stanford University, USA
SLAC National Accelerator Laboratory, Stanford University, USA

TALKS, DEPARTMENTAL COLLOQUIA, PRESENTATIONS AT CONFERENCES

Meeting names are in italic. Talks at bi-annual DES and LSST DESC collaboration meetings are not included.

Nov 2018	Brookhaven National Lab / Stony Brook, USA (**invited**)
Oct 2018	*Methods for Statistical Inference*, Institut Henri Poincaré, Paris (**invited**)
Oct 2018	Institute for Theory and Computation, Harvard University, USA (**invited**)
Sept 2018	*Colours of the Universe: Photometric Redshifts for Large Surveys*, Leiden, Netherlands (**invited**)
May 2018	*Consistency of Cosmological Datasets*, University of Cambridge (**invited**)
April 2018	*Statistical Challenges for LSS in the era of LSST*, Oxford University (**invited**)
Jan 2018	*Cosmoandes conference*, Pontificia Universidad Catolica de Chile (**invited**)
Nov 2017	Department of Astronomy & Astrophysics, University of Toronto, Canana (**invited**)
Nov 2017	Department of Physics, University of Michigan, USA (**invited**)
Jun 2017	Kavli Institute for Theoretical Physics, Santa Barbara (USA)
Apr 2017	Kavli Institute for the Physics and Mathematics of the Universe (IPMU), Tokyo (Japan)
Jan 2017	*BASP Frontiers Workshop 2017*, Villars, Switzerland (**invited**)
Nov 2016	Department of Astrophysical Sciences, Princeton University, USA (**invited**)
Oct 2016	Department of Physics, University of Oxford, UK (**invited**)
Oct 2016	Department of Physics, Yale University, USA (**invited**)
Sept 2016	Department of Physics & Astronomy, Rutgers University, USA (**invited**)
May 2016	Department of Physics & Astronomy, University of Delaware, USA (**invited**)
May 2016	*Statistical Challenges in 21st Century Cosmology*, Chania, Greece.
Apr 2016	Center for Data Science, New York University, USA (**invited**)
Apr 2016	American Physical Society (APS), Salt Lake City, USA (**invited**)
Apr 2016	McWilliams Center for Cosmology, Carnegie Mellon University, USA (**invited**)
Mar 2016	Kavli Institute for Particle Astrophysics and Cosmology, Stanford University, USA
Feb 2016	*SphereX Community Workshop*, California Institute of Technology, USA
Jan 2016	*Sampling & non-sampling methods in cosmology*, University of California, Berkeley, USA
Dec 2015	Dept of Physics & Astronomy, Imperial College London, UK (**invited**)
Mar 2015	Dept of Physics & Astronomy, University College London, UK
Jan 2015	*BASP Frontiers Workshop 2015*, Villars, Switzerland (**best presentation prize**)
Nov 2014	Lawrence Berkeley Laboratory, Berkeley, USA (**invited**)
Nov 2014	Perimeter Institute, Waterloo, Canada (**invited**)
Nov 2014	Institute of Astronomy & DAMPT, University of Cambridge, UK (**invited**)
Sept 2014	AstroLunch, Department of Astrophysical Sciences, Princeton University, USA
Sept 2014	Institute for Strings, Cosmology & Astroparticle Physics, Columbia University, USA
Sept 2014	Institute for Theory and Computation, Harvard University, USA
Sept 2014	Center for Cosmology and AstroParticle Physics, Ohio State University, USA
Aug 2014	COSMO 2014, Kavli Institute for Cosmological Physics, University of Chicago, USA
July 2014	Laboratorio Interinstitucional de e-Astronomia, Rio de J., Brazil (webminar, **invited**)
July 2014	*Science on the Sphere, Royal Society Seminar*, Chicheley Hall, UK (**invited**)
Jun 2014	*Astronomy and Biomedical Imaging Workshop*, UCL Crick Institute, UK
Apr 2014	*Statistical Challenges in 21st Century Cosmology*, Lisbon, Portugal
Apr 2014	*Progress on Old and New Themes in Cosmology*, Avignon, France
Mar 2014	*49th Rencontres de Moriond*, La Thuile, Italy
Dec 2013	London Cosmology Discussion Meeting (LCDM), UK
Nov 2013	Department of Physics, University of Oxford, UK (**invited**)
Oct 2013	Institute of Cosmological Sciences, University of Barcelona, Spain
Aug 2013	*Wavelet and Sparsity XV, SPIE 2013*, San Diego, USA (**invited**)
July 2013	*Challenges for Next Gen. LSS Surveys*, Ascona, Switzerland (**best presentation prize**)

PUBLICATIONS

Journal names are abbreviated as follows:

MNRAS : Monthly Notices of the Royal Astronomical Society
IEEE TSP : IEEE Transactions on Signal Processing
PRD : Physics Review D
ApJ: the Astrophysical Journal
A&A : Astronomy & Astrophysics
PRL : Physics Review Letters

'*' indicates full co-leadership of a project or direct supervision of a student (on project idea, implementation, and paper writing). The collaborator/student is flagged with *.

For other non-first-other papers I was either a consultant on the data/methods components of the project, or I contributed code or data-products and wrote the relevant paper sections.

1. *Hierarchical modeling and statistical calibration for photometric redshifts*.
B. Leistedt, D. W. Hogg, R. Wechsler, J. DeRose, submitted to ApJ.
2. *Improving Gaia parallax precision with a data-driven model of stars*.
L. Anderson, D. W. Hogg, **B. Leistedt**, A. M. Price-Whelan, ApJ, 156, 4, 2018.
3. *Dark Energy Survey Year 1 Results: Curved-Sky Weak Lensing Mass Map*.
C. Chang *et al*, DES collaboration (including **B. Leistedt**), MNRAS, 475 (3): 3165-3190, 2018.
4. *Inferring the binary and trinary stellar populations in photometric and astrometric surveys*.
A. Widmark*, **B. Leistedt**, D. W. Hogg, ApJ, 857, 2, 2018.
5. *Correlations in the 3D Lyman-alpha forest contaminated by high column density absorbers*.
K. Rogers, S. Bird, H. V. Peiris, A. Pontzen, A. Font-Ribera, **B. Leistedt**, MNRAS 476 (3), 2018.
6. *Dark Energy Survey Year 1 Results: Photometric Data Set for Cosmology*.
A. Drlica-Wagner *et al*, DES collaboration (including **B. Leistedt**), ApJS 235 2, 2018.
7. *Simulating the effect of high-density absorbers on the 1D Lyman-alpha forest flux power spectrum*.
K. Rogers, S. Bird, H. V. Peiris, A. Pontzen, A. Font-Ribera, **B. Leistedt**, MNRAS, 474 (3), 2018.
8. *Red clump stars and Gaia: Calibration of the Standard Candle*.
K. Hawkins*, **B. Leistedt**, J. Bovy, D. W. Hogg, MNRAS 471 (1): 722-729, 2017.
9. *Mapping dark matter on the celestial sphere with weak gravitational lensing*.
C. G. R. Wallis, J. D. McEwen, T. D. Kitching, **B. Leistedt**, A. Plouviez, submitted to MNRAS.
10. *Hierarchical inference of the color-magnitude diagram and shrinkage of stellar distance uncertainties*.
B. Leistedt, D. W. Hogg, ApJ, 154, 6, 2017.
11. *Data-driven, interpretable photometric redshifts trained on heterogeneous and unrepresentative data*.
B. Leistedt, D. W. Hogg, ApJ, 838, 1, 2017.
12. *Wavelet reconstruction of pure E and B modes for CMB polarisation and cosmic shear analyses*.
B. Leistedt, J. D. McEwen, M. Büttner, H. V. Peiris, MNRAS, 466 (3): 3728-3740, 2017.
13. *Hierarchical Bayesian inference of galaxy redshift distributions from photometric surveys*.
B. Leistedt, D. J. Mortlock, H. V. Peiris, MNRAS, 460(4): 4258-4267, 2016.
14. *Unbiased pseudo-Cl power spectrum estimation with mode projection*
F. Elsner, **B. Leistedt**, H. V. Peiris, MNRAS, 465(2), 1847-1855, 2017.
15. *Spin-SILC: CMB polarisation component separation with spin wavelets.*
K. Rogers, H. V. Peiris, **B. Leistedt**, J. D. McEwen, A. Pontzen, MNRAS, 463(3), 2310-2322, 2016.
16. *Second-generation curvelets on the sphere*.
J. Y. H. Chan, **B. Leistedt**, T. Kitching, J. D. McEwen, IEEE TSP, 65, 5-14.
17. *Mapping and simulating systematics due to spatially-varying observing conditions in DES SV data.*
B. Leistedt, H. V. Peiris, F. Elsner *et al* (DES collaboration), ApJS, 226, 2, 2016.

18. *Redshift distributions of galaxies in the DES SV shear catalogue and implications for weak lensing*.
C. Bonnett *et al.* (DES collaboration, including **B. Leistedt**), PRD, 94, 042005, 2016.
19. *Cosmology from Cosmic Shear with DES Science Verification Data*.
DES collaboration (including **B. Leistedt**), PRD, 94, 022001, 2016.
20. *Cosmic Shear Measurements with DES Science Verification Data*.
M. Becker *et al.* (DES collaboration, including **B. Leistedt**), PRD, 94, 022002, 2016.
21. *redMaGiC: Selecting Luminous Red Galaxies from the DES Science Verification Data*.
E. Rozo *et al.* (DES collaboration, including **B. Leistedt**), MNRAS, 461(2), 1431-1450, 2016.
22. *SILC: a new Planck Internal Linear Combination CMB temperature map using directional wavelets.*
K. Rogers, H. V. Peiris, **B. Leistedt**, J. D. McEwen, A. Pontzen, MNRAS, 460(3), 3014-3028, 2016.
23. *No galaxy left behind: Accurate clustering for incomplete galaxy samples in the Dark Energy Survey*.
E. Suchyta, E. Huff *et al.* (DES collaboration, including **B. Leistedt**), MNRAS, 457(1): 786-808, 2016.
24. *Debiasing systematics mitigation methods in galaxy angular clustering estimators.*
F. Elsner, **B. Leistedt**, H. V. Peiris, MNRAS, 456(2): 2095-2104, 2016.
25. *CMB lensing tomography with the DES Science Verification galaxies*.
T. Giannantonio *et al.* (DES collaboration, including **B. Leistedt**), MNRAS, 456(3), 3213-3244, 2016.
26. *Galaxy clustering, photometric redshifts & diagnosis of systematics in the DES SV data*.
M. Crocce *et al.* (DES collaboration, including **B. Leistedt**), MNRAS, 455(4): 4301-4324, 2016.
27. *A novel sampling theorem on the rotation group*.
J. D. McEwen, M. Büttner, **B. Leistedt**, H. V. Peiris, Y. Wiaux, IEEE Sig Proc Letters, 22, 12, 2015.
28. *Directional spin wavelets on the sphere*.
J. D. McEwen*****, **B. Leistedt**, M. Büttner, H. V. Peiris, Y. Wiaux, submitted to IEEE TSP.
29. *Modelling the Transfer Function for the Dark Energy Survey*.
C. Chang *et al.* (DES collaboration, including **B. Leistedt**), ApJ, 801, 73, 2015.
30. *3D weak lensing with spin wavelets on the ball*.
B. Leistedt, J. D. McEwen, T. Kitching, H. V. Peiris, PRD, 92, 123010, 2015.
31. *Constraints on primordial non-Gaussianity from 800,000 photometric quasars*.
B. Leistedt, H. V. Peiris, N. Roth, 2014, PRL, 113, 221301, 2014.
32. *Exploiting the full potential of photometric quasar surveys: Optimal power spectra through blind mitigation of systematics*.
B. Leistedt, H. V. Peiris, MNRAS, 444(1): 2-14, 2014.
33. *No new cosmological concordance with massive sterile neutrinos*.
B. Leistedt, H. V. Peiris, L. Verde, PRL, 113, 041301, 2014.
34. *S2LET: a code to perform fast wavelet analysis on the sphere*.
B. Leistedt, J. D. McEwen, P. Vandergheynst, Y. Wiaux, A&A, 558, A128, 2013.
35. *Estimating the large-scale angular power spectrum in the presence of systematics: a case study of Sloan Digital Sky Survey quasars*.
B. Leistedt, H. V. Peiris, D. Mortlock, A. Benoit-Lvy, A. Pontzen, MNRAS, 435(3): 1857-73, 2013.
36. *Exact Wavelets on the Ball*.
B. Leistedt, J. D. McEwen, IEEE TSP, 60, 6257-6269, 2012.
37. *3DEX: a code for Fast Fourier-Bessel Decomposition of All-Sky 3D Surveys*.
B. Leistedt, A. Rassat, J-L Starck, A. Refregier, A&A, 540, A60, 2011.