

Contact: [boris.leistedt@gmail.com](mailto:boris.leistedt@gmail.com)Homepage: <http://www.ixkael.com>**RESEARCH INTERESTS**

Data-driven observational cosmology, astrophysics, and fundamental physics.

[3,6,8,11,16] Analysis of galaxy survey data. Optimal statistical estimators & systematics mitigation.

[10,15] Novel precision observables: CMB polarisation, cosmic voids, 3D weak lensing.

[2,4] Testing fundamental physics: gravity, neutrino masses, primordial non-Gaussianity.

[5,7,17] 2D/3D spherical wavelets and sparsity. Applications to cosmology and geophysics.

*The numbers in brackets refer to first- or second-author journal publications on these topics, see list below.*

**RESEARCH RECORD**

2015 – present Postdoctoral fellow, **Center for Cosmology & Particle Physics, New York University (USA)**

2015 – present Visiting postdoctoral fellow, **Center for Data Science, New York University (USA)**

2014 – 2015 Postdoctoral fellow, **Dept of Physics & Astronomy, University College London (UK)**

Summer 2010 Research internship, **Cosmo-stat group, Astrophysics Dept, CEA Saclay (France)**

Summer 2009 Factory internship (assembly of servers & mainframes), **IBM Montpellier (France)**

**EDUCATION**

2011 – 2014 Doctor of Philosophy (Ph.D.) in Physics and Astronomy

**Dept of Physics & Astronomy, University College London (UK)**

Thesis: *Accurate cosmology with galaxy and quasar surveys*. Advisor: Hiranya Peiris

2006 – 2011 Double Diplôme d'Ingénieur (equiv. dual MSc in Electrical Engineering / Computer Science)

**University of Mons (Belgium) and Supélec – École Supérieure d'Électricité (France)**

Thesis: *Selection of optimal learning sets for preference modeling and decision making*

Advisors: Marc Pirlot (UMons) and Vincent Mousseau (École Centrale Paris)

2008 – 2011 Master de Physique Fondamentale, **Paris 11 – Université Orsay Paris-Sud (France)**

(equiv. MSc in Physics, in parallel with engineering degree)

**AWARDS AND HONORS**

2015 – present Simons Foundation Junior Research Fellowship (held at NYU)

2015 UCL Jon Darius Memorial Prize 2014-15 (outstanding postgraduate research in astrophysics)

2015 Runner-up, RAS Michael Penston Thesis Prize 2014 (best UK PhD thesis in astrophysics)

2011 – 2014 Perren & Impact studentships, supporting the PhD at UCL

2011 High Octane award (top of MSc class), Faculty of Engineering, University of Mons

2011 ORBEL award finalist (best MSc thesis in Operational Research in Belgium)

2008 – 2011 T.I.M.E. scholarship awarded by UMons and held at Supélec/Paris 11 (competitive exchange program between top European universities leading to a joint MSc degree)

**COMPUTING SKILLS**

Proficient in C, C++, Fortran, IDL, Matlab, Python, and HPC technologies (OpenMP, MPI, OpenCL).

**ACADEMIC SERVICE AND ORGANISATION OF WORKSHOPS**

- 2012 – present    Member (individual data-rights gained in 2015), **Dark Energy Survey (DES) collaboration**  
Significant contributions include: Identification and extraction of potential systematics from raw imaging data. Construction of data products: systematics maps, galaxy catalogues, depth and observation masks. Galaxy clustering and cross-correlations with CMB lensing and cosmic shear. Cosmological likelihoods, parameters estimation, systematics marginalisation.
- 2014 – present    Member (through NYU and UCL), **Large Synoptic Survey Telescope (LSST) collaboration**  
Instigator/coordinator of the "3D data compression" task force: benchmarking of 3D analysis techniques for data compression, galaxy clustering, and weak lensing.
- 2012 – present    Referee for MNRAS, JOSA
- 2013 – present    Co-organiser of the interdisciplinary *BASP Frontiers workshops* (every two years)
- 2013 – 2015       Seminar organiser for the UCL *Certificate in Astronomy* course
- June 2014        Co-organiser of the *Cross-correlating cosmic probes* conference in UCL

**SELECTED SEMINARS AND CONFERENCE TALKS**

Meeting names are in italic. Inter-disciplinary talks and meetings are highlighted with \*.  
Talks at bi-annual DES and LSST collaboration meetings are not included.

- 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       Institute for Advanced Study / 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       Laboratório 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

ApJ: the Astrophysical Journal  
A&A : Astronomy & Astrophysics

PRD : Physics Review D  
PRL : Physics Review Letters

## REFEREED JOURNAL ARTICLES (FIRST AUTHOR ONLY): &gt;150 CITATIONS

1. [3D weak lensing with spin wavelets on the ball.](#)  
**B. Leistedt**, J. D. McEwen, T. Kitching, H. V. Peiris, PRD, in press.
2. [Constraints on primordial non-Gaussianity from 800,000 photometric quasars.](#)  
**B. Leistedt**, H. V. Peiris, N. Roth, 2014, PRL, 113, 221301, 2014.
3. [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.
4. [No new cosmological concordance with massive sterile neutrinos.](#)  
**B. Leistedt**, H. V. Peiris, L. Verde, PRL, 113, 041301, 2014.
5. [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.
6. [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-Lévy, A. Pontzen, MNRAS, 435(3): 1857-73, 2013.
7. [Exact Wavelets on the Ball.](#)  
**B. Leistedt**, J. D. McEwen, IEEE TSP, 60, 6257-6269, 2012.
8. [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.

## PRE-PRINTS (FIRST AUTHOR ONLY)

9. [Hierarchical Bayesian inference of photometric redshifts and redshift distributions.](#)  
**B. Leistedt**, D. Mortlock, H. V. Peiris, to be submitted to MNRAS.
10. [Analysing CMB polarisation with spin directional wavelets.](#)  
**B. Leistedt**, J. D. McEwen, M. Büttner, H. V. Peiris, to be submitted to MNRAS.
11. [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), submitted to ApJS.

## REFEREED JOURNAL ARTICLES (COLLABORATIONS WITH DIRECT/SIGNIFICANT CONTRIBUTIONS ONLY)

12. [A novel sampling theorem on the rotation group.](#)  
J. D. McEwen, M. Büttner, **B. Leistedt**, H. V. Peiris, Y. Wiaux, IEEE Sig Proc Letters, in press.
13. [Modelling the Transfer Function for the Dark Energy Survey.](#)  
C. Chang *et al.* (DES collaboration, including **B. Leistedt**), ApJ, 801, 73, 2015.

## PRE-PRINTS (COLLABORATIONS WITH DIRECT/SIGNIFICANT CONTRIBUTIONS ONLY)

14. [A new Planck Internal Linear Combination CMB temperature map using directional wavelets.](#)  
K. Rogers, H. V. Peiris, J. D. McEwen, **B. Leistedt**, A. Pontzen, in prep.

15. [\*Second-generation curvelets on the sphere.\*](#)  
J. Y. H. Chan, **B. Leistedt**, T. Kitching, J. D. McEwen, submitted to IEEE TSP in Nov 2015.
16. [\*Debiasing systematics mitigation methods in galaxy angular clustering estimators.\*](#)  
F. Elsner, **B. Leistedt**, H. V. Peiris, submitted to MNRAS in Oct 2015.
17. [\*Directional spin wavelets on the sphere.\*](#)  
J. D. McEwen, **B. Leistedt**, M. Büttner, H. V. Peiris, Y. Wiaux, submitted to IEEE TSP in Aug 2015.
18. [\*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**), submitted to PRD in July 2015.
19. [\*Cosmology from Cosmic Shear with DES Science Verification Data.\*](#)  
DES collaboration (including **B. Leistedt**), submitted to PRD in July 2015.
20. [\*Cosmic Shear Measurements with DES Science Verification Data.\*](#)  
M. Becker *et al.* (DES collaboration, including **B. Leistedt**), submitted to PRD in July 2015.
21. [\*Redshift distributions of galaxies in the DES SV shear catalogue and implications for weak lensing.\*](#)  
C. Bonnett *et al.* (DES collaboration, including **B. Leistedt**), submitted to PRD in July 2015.
22. [\*Galaxy clustering, photometric redshifts & diagnosis of systematics in the DES Science Verification data.\*](#)  
M. Crocce *et al.* (DES collaboration, including **B. Leistedt**), submitted to MNRAS, 2015.
23. [\*CMB lensing tomography with the DES Science Verification galaxies.\*](#)  
T. Giannantonio *et al.* (DES collaboration, including **B. Leistedt**), submitted to MNRAS in July 2015.
24. [\*redMaGiC: Selecting Luminous Red Galaxies from the DES Science Verification Data.\*](#)  
E. Rozo *et al.* (DES collaboration, including **B. Leistedt**), submitted to MNRAS in July 2015.

## PROCEEDINGS ARTICLES (POSTED ON ARXIV ONLY)

25. [\*Analysing the polarisation of the CMB with spin scale-discretised wavelets.\*](#)  
**B. Leistedt**, J. D. McEwen, M. Büttner, H. V. Peiris, Y. Wiaux, P. Vanderghenst, BASP 2015.
26. [\*On spin scale-discretised wavelets on the sphere for the analysis of CMB polarisation.\*](#)  
J. McEwen, M. Büttner, **B. Leistedt**, H. V. Peiris, Y. Wiaux, P. Vanderghenst, 2014, SCCC21/IAU306.
27. [\*Flaglets on the ball for studying the large-scale structure of the Universe.\*](#)  
**B. Leistedt**, H. V. Peiris, J. D. McEwen, 2013, Wavelets & Sparsity XV, SPIE 2013.
28. [\*Fourier-Laguerre Transform, Convolution and Wavelets on the Ball.\*](#)  
J. D. McEwen, **B. Leistedt**, 2013, International Conference on Sampling Theory and Applications.
29. [\*Flaglets: Exact Wavelets on the Ball.\*](#) **B. Leistedt**, J. D. McEwen, 2013, BASP Frontiers 2013.