



LANUSSE François

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Department of Physics
Carnegie Mellon University
5000 Forbes Ave.
Pittsburgh, PA 15213, USA

Postdoctoral Researcher at Carnegie Mellon University Ingénieur Supélec

Education

- Sept. 2012 - Nov. 2015 **Ph.D. in Astrophysics: Reconstruction of dark matter maps from weak gravitational lensing**
*Defended on 20/11/2015, under supervision of J.-L. Starck at AIM, CEA Saclay
Paris 11 University - Orsay*
- Sept. 2011 - Aug. 2012 **Master 2 Research - Fundamental Physics**
*Specialisation: Nuclei Particles Astroparticles Cosmology
Paris 11 University - Orsay*
- Sept. 2010 - Aug. 2011 **Master 2 Research - Fundamental and Applied Mathematics**
Paul Verlaine University- Metz
- Sept. 2008 - Aug. 2011 **Supélec Engineering school**
*Specialisation: Interactive Systems and Robotics
Suplec - Campus Gif-Sur-Yvette and Metz (3rd year)*

Professional experience

- Dec. 2015 - present **Postdoctoral researcher** - *Physics Department - Carnegie Mellon University*
Under supervision of Prof. **R. Mandelbaum** (CMU).
- Apr. - Sept. 2011 **Final year internship** - *CEA Saclay, Irfu - AIM*
Development of a three dimensional wavelet in spherical coordinates for the cosmological study of galaxy surveys under supervision of **J.-L. Starck** (CEA/Irfu-AIM) and **A. Rassat** (CEA/EPFL).
- Jul. - Aug. 2010 **Research internship** - *Paris Observatory - IMCCE*
Development of a statistical tool to estimate orbital parameters of trans-neptunian asteroids and implementation in MPI under supervision of **D. Hestroffer** (IMCCE)
- Jul. - Aug. 2009 **Industrial internship** - *Lardy Technical Center - RENAULT*
Development of a database interface for acoustic data.

Teaching Activities

- Tutorials
- IAU Symposium 306: Statistical Challenges in 21st Century Cosmology**
3 hours presentation and exercises on Sparse regularization of inverse problems.
Lisbon, Portugal, 25-29 May 2014.
- 2nd Workshop on Scientific Computing in Astronomy**
4 hours presentations and exercises on Wavelets, Sparsity, Denoising, Deconvolution and Morphological diversity.
Sao Paulo, Brazil, 3-6 June 2014.
- Practical Labs
- 2nd International Summer School on INtelligent Signal Processing for FrontIER Research and Industry**
10 afternoon sessions of 3 hours on Introduction to sparsity.
Paris, France, 14-25 July 2014.

Publications in peer-reviewed scientific journals

- Jun. 2016 **F. Lanusse**, J.-L. Starck, A. Leonard, S. Pires, [High resolution weak lensing mass mapping combining shear and flexion](#), *A&A*, 591, [arXiv:1603.01599](#)
- Jun. 2015 **F. Lanusse**, A. Rassat, and J.-L. Starck, [3D Galaxy Clustering with Future Wide-Field Surveys: Advantages of a Spherical Fourier-Bessel analysis](#), *A&A*, 578, [arXiv:1406.5989](#)
- May 2015 A. Leonard, **F. Lanusse**, and J.-L. Starck, [Weak lensing reconstructions in 2D & 3D: implications for clusters studies](#), *MNRAS*, 449, [arXiv:1502.05872](#)
- Apr. 2015 A. Moller, V. Ruhlmann-Kleider, **F. Lanusse**, J. Neveu, N. Palanque-Delabrouille, J.-L. Starck, [SNIa detection in the SNLS photometric analysis using Morphological Component Analysis](#), *JCAP*, 04, [arXiv:1501.02110](#)
- Nov. 2014 **F. Lanusse**, P. Paykari, J.-L. Starck, F. Sureau, J. Bobin., and A. Rassat, [PRISM: Recovery of the primordial spectrum from Planck data](#), *A&A*, 571, [arXiv:1410.2571](#)
- Jun. 2014 P. Paykari, **F. Lanusse**, J.-L. Starck, F. Sureau, and J. Bobin, [PRISM: Sparse Recovery of the Primordial Power Spectrum](#), *A&A*, 566, [arXiv:1402.1983](#)
- May 2014 A. Leonard, **F. Lanusse**, and J.-L. Starck, [GLIMPSE: Accurate 3D weak lensing reconstructions using sparsity](#), *MNRAS*, 440, [arXiv:1308.1353](#)
- Apr. 2012 **F. Lanusse**, A. Rassat, and J.-L. Starck, [Spherical 3D Isotropic Wavelets](#), *A&A*, 540, [arXiv:1112.0561](#)

Peer-reviewed conference proceedings

- Jan. 2017 M. Ravanbakhsh, **F. Lanusse**, R. Mandelbaum, J. Schneider, and B. Poczos, [Enabling Dark Energy Science with Deep Generative Models of Galaxy Images](#), *AAAI-17*, [arXiv:1609.05796](#). *I contributed to the development of the method, generated the training sets and analysed the results.*
- May. 2014 **F. Lanusse**, A. Leonard, J.-L. Starck, [Density reconstruction from 3D lensing: Application to galaxy clusters](#). *IAU Symposium, Volume 306*
- Sept. 2013 **F. Lanusse**, J.-L. Starck, [3D sparse representations on the sphere and applications in astronomy](#). *Proc. SPIE 8858, Wavelets and Sparsity XV, 88580K*
- Sept. 2013 **F. Lanusse**, A. Leonard, J.-L. Starck, [Imaging dark matter using sparsity](#). *Proc. SPIE 8858, Wavelets and Sparsity XV, 885824*

Contribution to books

May 2014 **F. Lanusse**, J.-L. Starck, A. Woiselle and M.J. Fadili, [3D Sparse Representations](#), Chapter in *Advances in Imaging and Electron Physics*, Volume 183.

Oral contributions to conferences

Invited talks

Spherical 3D wavelets for the study of wide galaxy surveys.
March 2013, CosmoStat2013: Statistical challenges from large data sets in cosmology and particle physics, Banff, Canada.

Using the CMB to reconstruct the primordial power spectrum.
July 2014, Science on the Sphere, Royal Society International Scientific Seminar, Chicheley Hall, UK.

International talks

Sparsity to the rescue of 3D weak lensing mass-mapping
May 2016, Cosmo21, Chania, Greece

Sparsity to the rescue of 3D weak lensing mass-mapping
June 2016, Statistical Challenges in Modern Astronomy VI, Pittsburgh, PA, USA

Sparsity based weak lensing map making.
September 2014, International workshop on Cosmology and Sparsity, Nice, France.

Catalog based 2D weak lensing map making.
May 2014, Euclid Consortium meeting, Marseille, France

3D sparse representations on the sphere and applications in astronomy.
August 2013, Wavelet and Sparsity XV, SPIE Optics & Photonics, San Diego, USA.

WALRUS: Sparsity-based approach to 3D weak lensing density reconstructions.
June 2013, Workshop on weak lensing - beyond the ordinary, Nice, France.

Posters

Deep Generative Models of Galaxy Images for the Calibration of the Next Generation of Weak Lensing Surveys
January 2017, AAS Meeting 229, Dallas, TX, USA

3D dark matter mapping from weak gravitational lensing
October 2014, Journées Jeunes Chercheurs CNES, Toulouse, France

Sparsity based 3d weak lensing map making
June 2013, Cosmo Probes 2013, Lausanne, Switzerland.

Public Softwares

MRS3D

Implementation of the 3D Spherical Wavelet Transform on the Sphere in C++ with IDL interface.
Package available at : <http://jstarck.free.fr/mrs3d.html>

PRISM

Sparse recovery of the Primordial Power Spectrum implemented in C++ with an IDL interface.
Part of the iSAP package available at : <http://www.cosmostat.org/isap.html>

CosmicPy

Python package for interactive cosmology, with an embedded fast C++ library for efficient computation of Spherical Fourier-Bessel power spectra.
Package available at: <http://cosmicpy.github.io/>

GLIMPSE

Sparsity based weak lensing mass-mapping software.
Package available at: <http://www.cosmostat.org/software/glimpse/>