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— Post-Doctorate —

Lieu Argonne National Laboratory, Lemont, IL, USA

Dates October 2021 – present

- Activités**
- Thermodynamical properties of simulated clusters
 - Baryon pasting: emulation of intracluster medium in gravity-only simulations
 - Millimeter-wave sky maps from cosmological simulations
 - Multi-wavelength studies of cluster samples
 - Supervision: Simulation of radio galaxies catalogs from cosmological simulations (post-bachelor internship, 6 months)

— Doctorate —

Titre Cosmology from NIKA2 Sunyaev-Zeldovich observations of galaxy clusters

Lieu Laboratoire de Physique Subatomique et de Cosmologie
Université Grenoble Alpes, Grenoble, France

Dates October 2018 – September 2021

Supervisor Pr. Frédéric Mayet

- Activities**
- Observations at the IRAM 30-m telescope
 - Analysis of NIKA2 raw data
 - Analysis of intracluster medium thermodynamics
 - Mass-observable scaling relations

— Scientific responsibilities —

2022 – present: PI of a joint SPT-eROSITA analysis project

- Title: Linking SZ and X-ray observables from eROSITA-selected galaxy clusters
- Study of statistical relationships between cluster observable at millimeter and X-ray wavelengths
- Goals: understanding differences in multiwavelength selection functions, studying multi-wavelength mass calibration of cluster samples

2019 – 2021: Responsible of the SZ pipeline of the NIKA2 collaboration

- Development and standardization of the NIKA2 SZ data analysis chain
- Products: data reduction software for NIKA2 SZ maps, analysis software for cluster properties from SZ maps

2019 – 2021: Responsible of the cluster database of the NIKA2 collaboration

— International collaborations —

2022 – present: Member of the Dark Energy Science Collaboration (DESC)
2022 – present: Member of the CMB-S4 collaboration
2022 – present: Member of the South Pole Telescope collaboration (SPT-3G)
2021 – present: Member of the Galaxy Clusters working group of the SPT collaboration
2019 – present: Member of the CHEX-MATE collaboration
2019 – present: Member of the NIKA2 collaboration Core Team
2018 – present: Member of the NIKA2 collaboration

— Scientific skills —

Galaxy clusters Cosmology, Sunyaev-Zeldovich effects, X-ray emission, Simulated clusters, Scaling relations

Data analysis Bayesian inference, Markov Chain Monte Carlo, Hierarchical models, Regression

Programming Python (scipy, astropy, emcee, pymc3), IDL, R, \LaTeX , bash, Version control (git, svn), documentation (Sphinx), Parallel computing (multithreading, MPI)

— Education —

2018 – 2021 Doctorate in cosmology, Université Grenoble Alpes, France

2016 – 2018 Master's degree in Physics, Université de Montpellier, France
Graduated with honors – Rank: 1st

2014 – 2016 Bachelor's degree in Physics, Université de Bordeaux, France

2012 – 2014 Two-year university degree in Applied Physics, Université de Bordeaux, France

— Summer schools —

ESCAPE Summer School – 2021 – Organizer: LAPP Annecy
Data analysis for astronomy, astroparticles & particle physics

Statistical Challenges in Modern Astronomy – 2021 – Organizer: PennState University

IN2P3 School of Statistics – 2021 – Organizer: IN2P3

Pedagogy in higher education – 2019 – Organizer: Université Grenoble Alpes

— Teaching —

2018-2021: 96h teaching, Université Grenoble Alpes, tutorials (T) et labs (L).

| Subject | Level | Teaching type | Hours |
|------------------------|----------|---------------|-------|
| Electromagnetism | 1st year | T, L | 56 h |
| Applied Thermodynamics | 3rd year | T | 30 h |
| Nuclear Physics | 5th year | L | 12 h |

— Conferences and Seminars —

International Conferences

- Observing the mm Universe with NIKA2, Roma, Italy, 2021
Presentation: A new software to measure pressure profiles from SZ observations
Presentation: The $Y_{500} - M_{500}$ scaling relation from the NIKA2 SZ Large Program
- CosmoGold IAP, Paris, France, 2019
Presentation + poster: High resolution SZ observations for cluster cosmology with NIKA2
- Observing the mm Universe with NIKA2, Grenoble, France, 2019
Presentation: A test case for faint galaxy clusters within the NIKA2 SZ Large Program

National Conferences

- Action Dark Energy National Colloquium, Paris, France, 2020
Presentation: High resolution SZ observations for cluster cosmology with NIKA2

Seminars

- Young Scientists Symposium Series, Argonne National Laboratory, USA, 2022
Mass calibration systematics in SZ cluster cosmology
- University of Michigan, Ann Arbor, USA, 2022
The NIKA2 SZ Large Program: High angular resolution SZ observations for cluster cosmology
- Laboratoire de Physique Subatomique et de Cosmologie, Grenoble, France, 2020
High-resolution SZ observations for cluster cosmology with NIKA2
- Institut d'Astrophysique et de Planétologie de Grenoble, Grenoble, France, 2020
High-resolution SZ observations for cluster cosmology with NIKA2

— Public codes —

panco2: Galaxy cluster pressure profile measurement from tSZ maps

- Public release: November 2022
- GitHub: [fkeruzore/panco2](https://github.com/fkeruzore/panco2); Documentation: panco2.readthedocs.io
- Forward-modelling MCMC analysis accounting for usual mm-wave observational systematics
- Tested on synthetic *Planck*, SPT, NIKA2 datasets; can be used for any mm-wave data

— References —

Frédéric Mayet, Professor, Université Grenoble Alpes
PhD supervisor – mayet@lpsc.in2p3.fr

Juan Francisco Macías-Pérez, Research director, LPSC
PhD team leader – macias@lpsc.in2p3.fr

Lindsey Bleem, Physicist, Argonne National Laboratory
Post-doctorate supervisor – lbleem@anl.gov

Katrin Heitmann, Physicist, Argonne National Laboratory
Post-doctorate team leader – heitmann@anl.gov

— Publications —

10 publications in peer-reviewed journals, 28 conference proceedings (02-24-2023).

Peer-reviewed articles

- F. Kéruszoré *et al.* “panco2: a Python library to measure intracluster medium pressure profiles from Sunyaev-Zeldovich observations,” *arXiv e-prints* (2022). arXiv: [2212.01439](#)
- F. Kéruszoré *et al.* “Exploiting NIKA2/XMM-Newton imaging synergy for intermediate-mass high- z galaxy clusters within the NIKA2 SZ large program. Observations of ACT-CL J0215.4+0030 at $z \sim 0.9$,” *A&A* 644 (2020). arXiv: [2009.02563](#)
- J. .-. Lestrade *et al.* “Candidate cosmic filament in the GJ526 field, mapped with the NIKA2 camera,” *A&A* 667 (2022). arXiv: [2209.12904](#)
- M. Muñoz-Echeverría *et al.* “Multi-probe analysis of the galaxy cluster CL J1226.9+3332: Hydrostatic mass and hydrostatic-to-lensing bias,” *arXiv e-prints* (2022). arXiv: [2209.07460](#)
- CHEX-MATE Collaboration *et al.* “The Cluster HEritage project with XMM-Newton: Mass Assembly and Thermodynamics at the Endpoint of structure formation. I. Programme overview,” *A&A* 650 (2021). arXiv: [2010.11972](#)
- G. Gianfagna *et al.* “Exploring the hydrostatic mass bias in MUSIC clusters: application to the NIKA2 mock sample,” *MNRAS* 502.4 (2021). arXiv: [2010.03634](#)
- A. J. Rigby *et al.* “GASTON: Galactic Star Formation with NIKA2 - evidence for the mass growth of star-forming clumps,” *MNRAS* 502.3 (2021). arXiv: [2101.08811](#)
- M. Ricci *et al.* “The XXL Survey. XLIV. Sunyaev-Zel’dovich mapping of a low-mass cluster at $z \sim 1$: a multi-wavelength approach,” *A&A* 642 (2020). arXiv: [2004.07866](#)
- L. Perotto *et al.* “Calibration and performance of the NIKA2 camera at the IRAM 30-m Telescope,” *A&A* 637 (2020). arXiv: [1910.02038](#)
- F. Ruppin *et al.* “Unveiling the Merger Dynamics of the Most Massive MaDCoWS Cluster at $z = 1.2$ from a Multiwavelength Mapping of Its Intracluster Medium Properties,” *ApJ* 893.1 (2020). arXiv: [1911.00560](#)

Conference proceedings

- F. Kéruszoré *et al.* “Forecasting the $Y_{500} - M_{500}$ scaling relation from the NIKA2 SZ Large Program,” vol. 257. European Physical Journal Web of Conferences. 2022. arXiv: [2111.01660](#)
 - F. Kéruszoré *et al.* “PANCO2: A new software to measure pressure profiles from resolved thermal SZ observations,” vol. 257. European Physical Journal Web of Conferences. 2022. arXiv: [2111.06493](#)
 - F. Kéruszoré *et al.* “A low-mass galaxy cluster as a test-case study for the NIKA2 SZ Large Program,” vol. 228. European Physical Journal Web of Conferences. 2020. arXiv: [1911.03005](#)
- + 25 conference proceedings as co-author (02-24-2023).

Doctorate thesis

F. Kéruszoré. “Cosmologie à partir des observations Sunyaev-Zeldovich d’amas de galaxies avec NIKA2.” PhD thesis. 2021, [Manuscript \(in french\)](#)