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— Post-Doctorate —

Lieu Argonne National Laboratory, Lemont, IL, USA

Dates October 2021 – present

Activities

- Thermodynamic properties of simulated clusters
- Baryon pasting: emulation of thermodynamic properties of simulated clusters
- Millimeter-wave sky maps from cosmological simulations
- Multi-wavelength studies of galaxy cluster samples
- Supervision: post-bachelor internship, 6 months

Simulated catalogs of radio galaxies at mm wavelengths

— PhD in cosmology —

Title High resolution SZ observations for cluster cosmology with NIKA2

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

Dates October 2018 – September 2021

Supervision Pr. Frédéric Mayet

Activities

- Observations at the IRAM 30-m telescope
- Analysis of NIKA2 raw data
- Analysis of the thermodynamic properties of the intracluster medium
- Mass-observable scaling relations

— Scientific responsibilities —

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

- Title: Linking SZ and X-ray observables from eROSITA-selected galaxy clusters
- Study of statistical relations between galaxy cluster observables in X-ray and mm-wave
- Goals: understanding differences between SZ and X-ray samples and observables, study of the cluster mass calibration at both wavelengths

2019 – 2021: Responsible of the NIKA2 collaboration SZ pipeline

- Development and standardization of the analysis chain of NIKA2 cluster observations
- Products: NIKA2 raw data reduction software for SZ observations, intracluster medium thermodynamic properties measurement software

2019 – 2021: Responsible of the NIKA2 collaboration SZ database

— 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 (SPT) collaboration
2021 – present: Member of the Galaxy Clusters working group of the SPT collaboration
2019 – present: Member of the CHEX-MATE collaboration
2019 – present: Core Team member of the NIKA2 collaboration
2018 – present: Member of the NIKA2 collaboration

— Skills —

Galaxy clusters Cosmology, Sunyaev-Zeldovich effect, X-ray emission
Intracluster medium thermodynamics, Scaling relations,
 N -body simulated clusters

Data analysis Bayesian inference, Monte Carlo Markov Chains,
Regression, Hierarchical modelling,

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

— Education —

2018 – 2021 PhD 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 degree in applied physics, Université de Bordeaux, France

— Summer schools —

ESCAPE Summer School – 2021 – Organizer: LAPP Annecy
Data analysis for astronomy, astroparticle & 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 of teaching at Université Grenoble Alpes, tutorials (T) and labs (L).

Subject	Year	Type	Hours
Electromagnetism	1st year	T, L	56 h
Applied thermodynamics	3rd year	T	30 h
Nuclear Physics	5th year	L	12 h

— Conferences & Seminars —

International Conferences

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

National Conferences

- *Action Dark Energy* national colloquium, Paris, France, 2020
Talk: High resolution SZ observations for cluster cosmology with NIKA2

Seminars

- Young Scientists Symposium Series, Argonne National Laboratory, USA, 2022
Mass calibration systematics in Sunyaev-Zeldovich 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: pressure profile measurements from SZ maps of galaxy clusters

- Public release date: November 2022
- GitHub: [fkeruzore/panco2](https://github.com/fkeruzore/panco2); Documentation: panco2.readthedocs.io
- Forward modeling MCMC analysis, enabling taking into account usual systematics
- Tested on simulated *Planck*, SPT, NIKA2 maps; may be used for any mm-wave cluster observations

— References —

Lindsey Bleem, Physicist, Argonne National Laboratory
Postdoc supervisor – bleem@anl.gov

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

Katrin Heitmann, Physicist, Argonne National Laboratory
Postdoc team leader – heitmann@anl.gov

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

— Publications —

10 publications in peer-reviewed journals, 28 conference proceedings (03-14-2023).

Peer-reviewed articles

- F. Kéruzoré *et al.* “Panco2: A Python Library to Measure Intracluster Medium Pressure Profiles from Sunyaev-Zeldovich Observations,” *The Open Journal of Astrophysics* 6 (2023). arXiv: [2212.01439](#)
- F. Kéruzoré *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](#)
- M. Muñoz-Echeverría *et al.* “Multi-probe analysis of the galaxy cluster CL J1226.9+3332. Hydrostatic mass and hydrostatic-to-lensing bias,” *A&A* 671 (2023). arXiv: [2209.07460](#)
- J.-F. Lestrade *et al.* “Candidate cosmic filament in the GJ526 field, mapped with the NIKA2 camera,” *A&A* 667 (2022). arXiv: [2209.12904](#)
- 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](#)
- 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](#)
- 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](#)
- 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. Kéruzoré *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. Kéruzoré *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. Kéruzoré *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 (03-14-2023).

Doctorate thesis

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