TOBIAS I. LIAUDAT

Ph.D. Student

CosmoStat laboratory, Astrophysics Department, CEA Saclay

Contact: tobiasliaudat@gmail.com
Address: Office 272, Building 709, CEA Saclay, Orme des Merisiers, 91191 Gif-sur-Yvette, France
Webpage: tobias-liaudat.github.io • **Software:** github.com/tobias-liaudat
Nationality & date of birth: Argentinian, 18 May 1994

EDUCATION

CEA Saclay / Université Paris-Saclay — Nov. 2019 - Present
Ph.D. in astrophysics — *Saclay, France*
- Topic: Data-driven point spread function modelling for the Euclid space mission.
- Supervisors: Jean-Luc Starck & Martin Kilbinger.

Université de Rennes I / Centrale Supélec / IMT Atlantique — Aug. 2017 - Sep. 2018
Master 2 Research - SISEA — *Brest, France*
- Specialization in signal and image processing. Joint with IMT Atlantique engineering degree.
- Ranked 1st out of all master students.

IMT Atlantique — Aug. 2016 - Sep. 2018
Telecommunications Engineering degree — *Brest, France*
- One of France's top-engineering schools. Specialization in signal and image processing, and machine learning.
- Recipient of the Eiffel excellence scholarship for a joint degree with the University of Buenos Aires.

Engineering School of the University of Buenos Aires — Mar. 2012 - Sep. 2019
Electronic Engineering degree — *Buenos Aires, Argentina*
- Specialization in signal and image processing, electronic circuits and computer science. GPA: 9.23/10.
- Ranked 4th of 1634 students when starting the joint degree in 2016.

PROFESSIONAL EXPERIENCE

École Polytechnique, Applied Mathematics Department — Aug. 2020 - Present
Teaching assistant — *Palaiseau, France*
- Teaching for bachelor and MSc. students in the top ranked French engineering school.

École Nationale de la Statistique de l'Administration Économique — Oct. 2018 - Feb. 2019
Research assistant — *Palaiseau, France*
- Topic: Regularized optimal transport for signed measures. Supervisor: Marco Cuturi.

CosmoStat, CEA Saclay — Mar. 2018 - Sep. 2018
Research internship — *Saclay, France*
- Topic: Distributed sparse blind source separation for very large-scale datasets. Supervisor: Jérôme Bobin

Thales Air Systems — Jul. 2017 - Sep. 2017
Summer internship — *Limours, France*
- Topic: Development of tools to evaluate civil radar performances. Supervisor: Daniel Nguyen.

MEMBERSHIP IN SCIENTIFIC COLLABORATIONS

Euclid consortium — Nov. 2019 - Present
UNIONS/CFIS collaboration — Nov. 2019 - Present

TECHNICAL SKILLS

Main programming language	Python (TensorFlow, Numpy, ...)
Programming languages I have used	MATLAB, C, Java, Shell, Assembly
Other tools	Git, LaTex, HPC (SLURM, TORQUE, SMP, MPI), CI, PyPI Experience with CPU and GPU computer clusters
Astronomical software	PSFEx, SExtractor, GalSim, ShapePipe

TEACHING

École Polytechnique, Applied Mathematics Department Aug. 2020 - Present

Teaching assistant at France's top engineering school. MSc and bachelor students.

Year 2021-2022

- *Optimization and control* [MAP435] for MSc. students with Prof. Grégoire Allaire.
- *Applied mathematics python projects* [MAP361P] for MSc. students with Prof. Arvind Singh.

Year 2020-2021

- *Statistics* [MAP433] for MSc. students with Prof. Eric Moulines.
- *Optimization and control* [MAP435] for MSc. students with Prof. Grégoire Allaire.
- *Mathematical modelling* [MAA107] for Bachelor students with Prof. Vincent Bansaye and Prof. Thibaut Mastrolia.
- *Applied mathematics python projects* [MAP361P] for MSc. students with Prof. Arvind Singh.

STUDENT INTERNSHIP SUPERVISION

CosmoStat, CEA Saclay

- Ezequiel Centofanti, MSc. student, 6 months (2022). Topic: Joint PSF and stellar SED estimation for *Euclid*.
- Aziz Ayed, MSc. student, 5 months (2021). Topic: Deep denoisers for the MCCD PSF model.
- Jérôme Bonnin, MSc. student, 6 months (2019-2020). Topic: RCA for CFIS and on the MCCD PSF model.

SELECTED PRESENTATIONS AND CONFERENCES

Presentations within the Euclid Consortium are omitted.

Seminar to the BASP group at Heriot-Watt University	Online. Mar. 2022
SIAM 2022 Conference on Imaging Science (IS22)	Online. Mar. 2022
NeurIPS, Machine Learning and the Physical Sciences Workshop. (Poster)	Online. Dec. 2021
Lancement de l'axe Astrophysique de la Graduate School Physique.	Saclay, France. Nov. 2021
52èmes Journées de Statistiques de la Société Française de Statistique.	Online. Jun. 2021
Peyresq summer school on signal and image processing.	Online. Jun. 2021
2021 UNIONS CFIS/Pan-STARRS/WISHES Collaboration Meeting.	Online. Mar. 2021
SPARS conference. (Poster)	Toulouse, France. July 2019
CosmoStat seminar. Optimal transport for signed measures.	Saclay, France. Feb. 2019

AWARDS & DISTINCTIONS

Distinguished student award University of Buenos Aires, Argentina, 2017

Eiffel excellence scholarship Campus France, 2016

- Awarded to outstanding international students to do a joint degree in France.

Gold medal award St. Luke's College, Buenos Aires, Argentina, 2011

- Delivered to the best student of the 2011 class.

MISCELLANEOUS

- Fluent in Spanish (mother tongue), English and French.
- Organizer of the CosmoStat Journal club and the laboratory's seminar.
- Organizer of a working and reading group on geometric deep learning.
- Reviewed articles for ApJ.

REFERENCES

Dr. Jean-Luc Starck — CosmoStat laboratory, CEA-Saclay
Director of research — *Saclay, France*
· Contact: jean-luc.starck@cea.fr

Dr. Jérôme Bobin — LILAS, CEA-Saclay
Permanent researcher — *Saclay, France*
· Contact: jerome.bobin@cea.fr

Dr. François Lanusse — CosmoStat laboratory, CEA-Saclay
CNRS Researcher — *Saclay, France*
· Contact: francois.lanusse@cea.fr

Dr. Martin Kilbinger — CosmoStat laboratory, CEA-Saclay
Permanent Researcher — *Saclay, France*
· Contact: Martin.Kilbinger@cea.fr

Dr. Christophe Kervazo — IMAGES group, Télécom ParisTech
Assistant Professor — *Palaiseau, France*
· Contact: christophe.kervazo@telecom-paris.fr

PUBLICATIONS IN PEER-REVIEWED SCIENTIFIC JOURNALS

Mar. 2022 — **Liaudat, T.**, Starck, J.-L., Kilbinger, M., and Frugier, P.-A. (2022). *Rethinking data-driven point spread function modeling with a differentiable optical model.* Submitted. arXiv:2203.04908.

Jul. 2021 — Guinot, A., Kilbinger, M., Farrens, S., Peel, A., Pujol, A., Schmitz, M., Starck, J.-L., Erben, T., Gavazzi, R., Gwyn, S. D. J., Hudson, M. J., Hildebrandt, H., **Liaudat, T.**, Miller, L., Spitzer, I., Van Waerbeke, L., Cuillandre, J.- C., Fabbro, S., McConnachie, A., and Mellier, Y. (2021). *Shapepipe: a new shape measurement pipeline and weak-lensing application to UNIONS/CFIS data.* Submitted to A&A (July 2021). arXiv:2204.04798.

Feb. 2021 — **Liaudat, T.**, Bonnin, J.[1], Starck, J.-L., Schmitz, M. A., Guinot, A., Kilbinger, M., and Gwyn, S. D. J. (2021). *Multi-ccd modelling of the point spread function.* A&A, 646:A27.

Nov. 2019 — Kervazo, C., **Liaudat, T.**, and Bobin, J. (2020). *Faster and better sparse blind source separation through mini-batch optimization.* Digital Signal Processing, 106:102827.

[1] MSc. student mentored by Liaudat, T.

PUBLICATIONS IN PEER-REVIEWED CONFERENCES

Dec. 2021 — **Liaudat, T.**, Starck, J.-L., Kilbinger, M., and Frugier, P.-A. (2021). *Rethinking the modeling of the instrumental response of telescopes with a differentiable optical model.* Fourth Workshop on Machine Learning and the Physical Sciences (NeurIPS 2021). arXiv:2111.12541.

Jun. 2021 — **Liaudat, T.**, Starck, J.-L., and Kilbinger, M. (2021) *Semi-parametric wavefront modelling for the point spread function.* In proceedings of the 52ème Journées de Statistiques de la Societé Française de Statistique (SFdS).

Apr. 2019 — **Liaudat, T.**, Bobin, J., and Kervazo, C. (2019). *Distributed sparse BSS for large-scale datasets.* In 2019 SPARS conference proceedings. hal-02088466.