

# TOBIAS I. LIAUDAT

Ph.D. Student (expected graduation October 2022)

CosmoStat laboratory, Astrophysics Department, CEA Saclay

Contact: [tobiasliaudat@gmail.com](mailto:tobiasliaudat@gmail.com)

Address: Office 272, Building 709, CEA Saclay, Orme des Merisiers, 91191 Gif-sur-Yvette, France

Webpage: [tobias-liaudat.github.io](https://tobias-liaudat.github.io) • Software: [github.com/tobias-liaudat](https://github.com/tobias-liaudat)

Nationality & date of birth: Argentinian, 18 May 1994

## EDUCATION

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**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 / 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 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.
- Ranked 4th of 1634 students when starting the joint degree in 2016.

## PROFESSIONAL EXPERIENCE

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**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 a tool to evaluate civil radar performances. Supervisor: Daniel Nguyen.

## MEMBERSHIP IN SCIENTIFIC COLLABORATIONS

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## TECHNICAL SKILLS

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Main programming language	Python (TensorFlow, Numpy, ...)
Programming languages I have used	MATLAB, C, Java, Shell, Assembly
Other tools	Git, LaTeX, HPC (SLURM, TORQUE, SMP), CI, PyPI
Astronomical software	PSFEx, SExtractor, GalSim, ShapePipe

## TEACHING

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École Polytechnique Aug. 2020 - Present

Teaching assistant at the Applied Mathematics Department. MSc and bachelor students.

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](#).

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](#).

## STUDENT INTERNSHIP SUPERVISION

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CosmoStat, CEA Saclay Nov. 2019 - Sep. 2021

- [Jérôme Bonnin](#), MSc. student, 6 months. Topic: RCA for CFIS and the MCCD PSF model.
- [Aziz Ayed](#), MSc. student, 5 months. Topic: Deep denoisers for the MCCD PSF model.

## SELECTED PRESENTATIONS AND CONFERENCES

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*Presentations within the Euclid Consortium are omitted.*

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

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<i>Distinguished student award</i>	University of Buenos Aires, Argentina, 2017
<i>Eiffel excellence scholarship</i>	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

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- Mother tongue: Spanish. Fluent: English and French.
- Reviewed articles for ApJ.
- Organizer of the [CosmoStat](#) Journal club and seminar.

## REFERENCES

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- Dr. Jean-Luc Starck**  
*Director of research*  
· Contact: [jean-luc.starck@cea.fr](mailto:jean-luc.starck@cea.fr)  
CosmoStat laboratory, CEA-Saclay  
Saclay, France
- Dr. Jérôme Bobin**  
*Permanent researcher*  
· Contact: [jerome.bobin@cea.fr](mailto:jerome.bobin@cea.fr)  
LILAS, CEA-Saclay  
Saclay, France
- Dr. François Lanusse**  
*CNRS Researcher*  
· Contact: [francois.lanusse@cea.fr](mailto:francois.lanusse@cea.fr)  
CosmoStat laboratory, CEA-Saclay  
Saclay, France
- Dr. Martin Kilbinger**  
*Permanent Researcher*  
· Contact: [Martin.Kilbinger@cea.fr](mailto:Martin.Kilbinger@cea.fr)  
CosmoStat laboratory, CEA-Saclay  
Saclay, France
- Dr. Christophe Kervazo**  
*Assistant Professor*  
· Contact: [christophe.kervazo@telecom-paris.fr](mailto:christophe.kervazo@telecom-paris.fr)  
IMAGES group, Télécom ParisTech  
Palaiseau, France

## PUBLICATIONS IN PEER-REVIEWED SCIENTIFIC JOURNALS

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- 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).
- Feb. 2021      **Liaudat, T.**, Bonnin, J.<sup>1</sup>, 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.

<sup>1</sup> MSc. student mentored by Liaudat, T.

## PUBLICATIONS IN PEER-REVIEWED CONFERENCES

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- Dec. 2021      **Liaudat, T.**, Starck, J.-L., and Kilbinger, M. (2021). *Rethinking the modeling of the instrumental response of telescopes with a differentiable optical model*. In Advances in Neural Information Processing Systems (NeurIPS). Accepted in the [Machine Learning and the Physical Sciences workshop](#).
- 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 Société 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](#).