KÉLIAN SOMMER

PhD student in Astrophysics and Aerospace Engineer

kelian98.github.io
kelian.sommer@umontpellier.fr
+33 (0)7 77 91 83 62
Montpellier, France

CURRENT POSITION

Oct. 2021 - present **PhD in Astrophysics** — **Université de Montpellier, France**
Laboratoire Univers et Particules de Montpellier - CNRS/IN2P3

RESEARCH INTERESTS

- **Instrumentation:** calibration of sensors and telescope instruments, instrumental and atmosphere transmission, uncooled infrared thermal detectors, control-command methods
- **Cosmology:** type Ia supernovae and dark energy
- **Techniques:** photometry, radiometry, reduction and processing pipelines, data analysis, light-curve fitting, deep learning

EDUCATION

Oct. 2021 - Oct. 2024 **PhD in Astrophysics** — **Université de Montpellier, France**
Laboratoire Univers et Particules de Montpellier - CNRS/IN2P3
Subject: High-precision photometry in the era of ZTF and LSST cosmological surveys: characterization of instrumental and atmospheric transmissions
Advisors: Bertrand Plez, Johann Cohen-Tanugi, Eric Nuss†

Sep. 2016 - Sep. 2021 **Master's degree in Aerospace Engineering** — **ESTACA Engineering School, Paris-Saclay, France**
Propulsion systems, aerodynamics, operations
Orbital mechanics, Guidance Navigation & Control, mechanical, thermal and electrical architecture
Real-Time Operating Systems, microcontroller programming, sensors and actuators

2019 - 2021 **University diploma** — **Observatoire de Paris, France**
Fundamentals for astrophysics (Graduate level)
Instrumentation, measuring chain and projects (Master level)

2019 - 2020 **Graduate level teaching units** — **Faculté des Sciences et Ingénierie, Sorbonne Université, Paris, France**
Quantum mechanics
Electromagnetism and optics

PREVIOUS RESEARCH EXPERIENCE

Feb. 2021 - Aug. 2021 **Master's degree internship (2nd year)** — **Université de Montpellier, France**
Laboratoire Univers et Particules de Montpellier - CNRS/IN2P3
Subject: Atmosphere characterization with an uncooled infrared thermal camera instrument prototype
Advisors: Eric Nuss†, Bertrand Plez, Johann Cohen-Tanugi

Jun. 2020 - Sep. 2020 **Master's degree internship (1st year)** — **Marseille, France**
Centre de Physique des Particules de Marseille - CNRS/IN2P3
Subject: Development of a control-command software for LISA space-based gravitational waves detector prototype bench
Advisor: Aurelia Secroun

TECHNICAL AND COMPUTATIONAL SKILLS

- **Operating systems/environments:** UNIX/Linux, Windows, Docker
- **Computer languages:** Python, C/C++, Bash, LaTeX, SQL
- **Astronomical software:** SourceExtractor, SaoDS9, PixInsight
- **CAD:** Catia, Solidworks, FreeCAD, Fusion360
- **Miscellaneous/tools:** 3D printing, soldering, Git

LANGUAGES

French - native, **English** - fluent, **Spanish** - basics, **German** - basics

PUBLICATIONS

NASA ADS link to all publications

Published

- M. Betoule, S. Antier, E. Bertin, P. É. Blanc, S. Bongard, J. Cohen Tanugi, S. Dagoret-Campagne, F. Feinstein, D. Hardin, C. Juramy, L. Le Guillou, A. Le Van Suu, M. Moniez, J. Neveu, É. Nuss, B. Plez, N. Regnault, E. Sepulveda, K. Sommer, T. Souverin, and X. F. Wang. StarDICE. I. Sensor calibration bench and absolute photometric calibration of a Sony IMX411 sensor. A&A, 670:A119, Feb. 2023
- B. Carreres, J. E. Bautista, F. Feinstein, D. Fouchez, B. Racine, M. Smith, M. Amenouche, M. Aubert, S. Dhawan, M. Ginolin, A. Goobar, P. Gris, L. Lacroix, E. Nuss, N. Regnault, M. Rigault, E. Robert, P. Rosnet, K. Sommer, R. Dekany, S. L. Groom, N. Sravan, F. J. Masci, and J. Purdum. Growth-rate measurement with type-Ia supernovae using ZTF survey simulations. A&A, 674:A197, June 2023
- T. Souverin, J. Neveu, M. Betoule, S. Bongard, S. Brownsberger, J. Cohen-Tanugi, S. Dagoret-Campagne, F. Feinstein, C. Juramy, L. Le Guillou, A. Le Van Suu, P. E. Blanc, F. Hazenberg, E. Nuss, B. Plez, E. Sepulveda, K. Sommer, C. Stubbs, N. Regnault, and E. Urbach. Measurement of telescope transmission using a Collimated Beam Projector. *arXiv e-prints*, page arXiv:2206.07530, June 2022

In review

- K. Sommer, J. Cohen-Tanugi, B. Plez, M. Betoule, S. Bongard, L. Le Guillou, J. Neveu, E. Nuss, E. Sepulveda, T. Souverin, M. Moniez, and C. W. Stubbs. Design and performance of a Collimated Beam Projector for telescope transmission measurement using a broadband light source. *arXiv e-prints*, page arXiv:2312.02835, Dec. 2023

In prep.

- K. Sommer, J. Cohen-Tanugi, E. Nuss, B. Plez, M. Moniez, S. Dagoret-Campagne, M. Betoule, L. Le Guillou, S. Bongard, T.Souverin, J. Neveu, E. Sepulveda. Calibration of an uncooled LWIR thermal camera for cirrus cloud detection in astronomy. MDPI Sensors
- K. Sommer, W. Kabalan, R. Brunet, A. Boucaud. Infrared Radiometric Image Classification and Segmentation of Cloud Structure Using Deep-learning Framework for Ground-based Infrared Thermal Camera Observations. Atmosphere Measurement Techniques

COLLABORATIONS

Oct. 2021 - present — **The Dark Energy Science Collaboration of the Vera Rubin Observatory Legacy Survey of Space and Time**
Involvement in the Photometric Calibration Working Group

Feb. 2021 - present — **The StarDICE collaboration**
Metrology experiment designed to measure reference spectrophotometric CALSPEC stars to the mmag level relative to laboratory flux for type Ia supernovae cosmology

Oct. 2021 - present — **Zwicky Transient Facility**
Technical contribution to the development of an instrument capable of measuring the telescope system's throughput to the mmag level

TEACHING EXPERIENCE

Fall 2022 — **Teaching assistant** — **Université de Montpellier, France**
Supervision of observational astrophysics project at Observatoire de Haute-Provence for Master's students

TALKS

15 Dec. 2023 — **Rubin LSST-France meeting** — **CC-IN2P3, Lyon, France**
Recent progress of the long-wave infrared instrument for atmosphere monitoring within the StarDICE experiment

7 Dec. 2022 — **Journées Scientifiques et Techniques du Laboratoire** — **LUPM, Montpellier, France**
Improving photometric calibration for type Ia supernovae cosmology in the era of wide-field surveys with the StarDICE experiment and the CBP instrument

30 Nov. 2022 — **IN2P3 School of Instrumentation : "From detector to measurement"** — **Centre CAES, Fréjus, France**
Systematic error reduction for type Ia supernovae cosmology with the photometric surveys ZTF and LSST

13 May 2022 — **ZTF Spring Meeting** — **LPNHE, Paris, France**
Secondary maximum analysis for improved standardization of type Ia supernovae

26 Jan. 2022 — **56th Rencontres de Moriond 2022 - Cosmology** — **La Thuile, Italy**
StarDICE : instrumental flux calibration with an artificial star for type Ia supernovae cosmology with the Legacy Survey of Space and Time

OUTREACH

2022 - present **Société Française d'Astronomie et d'Astrophysique (SF2A)** **Association member**

2022 - present **Société Française d'Astronomie (SAF)** **Association member**

2022 - 2023 **Maison des Jeunes et de la Culture** **Castelnau-le-Lez, France**
Astronomy club manager

OTHER PROFESSIONAL EXPERIENCE

Summer 2019 **Zalando Logistics Sud SE CO. KG** **Lahr/Schwarzwald, Germany**
Warehouse and order picker

Summer 2018 **Safran Landing Systems** **Molsheim, France**
Assistant engineer internship in aeronautics

Summer 2017 **Socomec** **Huttenheim, France**
Production operator in electrical industry

Last updated version: December 17, 2023.