Dr. Nour SKAF

Research interests : Exoplanet, Optical Instrumenation, Adaptive Optics, High Contrast Imaging, Real-Time Control, Observation and Characterisation of Extrasolar Systems, Atmospheric Characterisation, Debris Disks.

Date of birth : 09/13/1994 – **Citizenship :** French. **Pronouns :** She/her/hers
E-mail : nour.skaf@gmail.com - noskaf@ucsc.edu – **Phone :** +1 (808) 807-8245

1 PROFESSIONAL EXPERIENCES

Postdoctoral Researcher – **UC Santa Cruz** **2023-2026**
Supervisors : Rebecca Jensen-Clem, Natalie Batalha
Member of the Interdisciplinary Fellows Cohort on Data Science **2024-2025**

PhD candidate – **LESIA/Observatoire de Paris** (France) **2019-2023**
Subaru Telescope, SCExAO (Hawaii, USA) *Self-optimisation of adaptive optics and characterization of exoplanetary system* ; supported by NASA grant # 80NSSC19K0336
Supervisors : Anthony Boccaletti, Olivier Guyon
Defense March 2nd 2023

Invited PhD student – **Center for Space Exochemistry data**
University College London (London, United Kingdom) **2019-2023**
Mentor : Giovanna Tinetti

Masters thesis – **University College London** (London, United Kingdom) **Summer 2019**
Detecting exoplanets via direct imaging on ground-based telescope using deep learning.
Supervisors : Ingo Waldmann, Gordon Yip, Nikos Nikolaou

Student Researcher, Optical engineering – **NASA Ames Research Center - Breakthrough Initiaves Foundation** (Mountain View, California, USA) **Summer 2018**
Optical hardware engineering for the Toliman space telescope proposal, for Alpha Centauri.
Supervisor : Eduardo Bendek

Student Researcher, Software engineering – **Subaru Telescope, NAOJ** (Hawaii, USA) **2017**
The adaptive optics instruments and their real time system for exoplanets. **8 months**
Supervisor : Olivier Guyon

Student Researcher, Quantum optics – **Pierre Aigrain Lab, ENS Ulm** (France) *Quantum cascade lasers, Tera-Hertz - Complex optical bench engineering, electronics and optronics.* **2016**

Student Researcher, Astrophysics – **Birmingham University** (United Kingdom) **July 2014**
Analysis of several groups of galaxies from GAMA to determine their varialization state.

Student Researcher, Astrophysics – **GEPI - Observatoire de Paris** (France) **June 2014**
Visible galaxies spectroscopy ; galaxies' composition, classification.

Private Tutoring in Maths and Physics **2013 to 2017**
From middle school to undergraduate level.

Facilitator, Astronomy tourism - professional **Summers 2012-2013**
Saint-Michel-l'Observatoire Astronomy Center, partnership with the Haute-Provence Observatory CNRS.
Wide astronomy outreach activities with children and wide public, with day trainings and activities, and night observations.

2 EDUCATION

Carl Sagan Workshop – Virtual
Circumstellar Disks and Young Planets. **July 2021**

Summer School ARES – **ESA's Ariel Summer School** Biarritz, France
Atmospheric characterisation of exoplanets for the Ariel space missionl **October 2019**

Doctoral school training – **Artificial Intelligence for Astrophysics** Virtual

MSc – **Imperial College London** London, United Kingdom
Fondamental Physics masters **September 2019**
Scientific : Authoring a literature review on the origin of hot Jupiters - Supervisor : James Owen.
Entrepreneurship for physicists : Inventing, designing and building the first prototype of a gaze-orientable head lamp for medical use.

Engineering degree – **Institut d'Optique Graduate School** Palaiseau, France
Optics and Photonics **September 2019**

Summer School in Adaptive Optics – **Santa Cruz University**
Santa Cruz, USA **August 2017**

BSc – **Université Pierre et Marie Curie (UPMC) - Sorbonne, PSL** Paris, France
Fundamental Physics **September 2015**

French Baccalaureate, Physics major passed with honors – Cavaillon, France **2012**

3 GRANTS & AWARDS

Private donation for research and DEI-related work **2024**
$10,000

L'Oréal-UNESCO prize for Women in Science - Young Talent France **2021**
15,000€

OCAV Doctoral Research Fellowship (Origins and Conditions of Apparition of Life)
Ph.D. grant, 3-year funding **2019**

Grant from the Astrobiology Center of Japan for two international conferences ($3k) **2019**

University scholarship of the Institut d'Optique Graduate School – 2 years **2015-2016**

Winner of the competition **"Speed Science"** of the French Academy of Sciences **2014**

University scholarship from Sorbonne Univerisity for an international internship (500€) **2014**

4 OUTREACH, TEACHINGS & SERVICE

Over 150 outreach talks with various associations, cultural centers, universities and schools in 10+ countries.

***Astronomy for All* - education and access to science in emerging countries, as a starting point for education, technological development, and peace-building within communities and across countries.**
Full time focus on astronomy and space sciences outreach, communication on citizen science projects, and work with research and educational institutions, foundations, and governmental institutions. Concrete actions in DR Congo, Cameroon, Rwanda, Bhutan, Thailand, Costa Rica. 5000+ students. Mentoring closely 8 students.
Funding sources : Breakthrough Initiatives Foundation, McDonald Institute, African Institute for Mathematical Sciences, Investing in People Association, and more. **March to September 2023**

Outreach Mission in French Guiana

Guiana to the Stars
3 weeks of outreach in French Guiana : activities in several schools throughout the state, public talks, and amator night observations, on the opportunity of the James Webb space telescope launch.
In total with 9 other astronomers, we met 5000+ people, including : 3600 students, 186 classrooms, 30 schools. 54 school teachers were trained on teaching astronomy. 12 public conferences, 1300+ people. **December 2021**

2-Day outreach in Moloka'i in two public and private schools, with the "Creating Equity in STEAM" organization. **November 2024**

Selection of outreach talks

- Opening talk for the NASA Space App challenge in DR Congo (remote) **October 2024**
- *Exoplanets : Bridging Worlds, Broadening Horizons*, Lick Observatory **July 2024**
- *Exoplanets : a cosmic odyssey*- Texas Eclipse Festival. **April 2024**
- *A human approach to the JWST images*- Star's Up space festival, Meudon, France. **September 2022**
- *Why explore space ?* - association "Jeunes IHEDN" (Institute of Advanced Studies in National Defence). **April 2021**

Selection of lecture talks and teachings

- TBC - co-instructor for the ASTR21 Introduction to Astronomy class, UCSC **Winter 2025**
- *Control Theory*, AO Summer School, CfAO UCSC **August 2024**
- Mentor for UCSC's Science Internship Program (SIP) : supervising five international high school students from underrepresented countries for seven weeks. **Summer 2024**
- *Direct imaging of exoplanet*, Ariel summer school, Biarritz France **October 2021**
- *Direct imaging*- Invited lecturer in G. Tinetti's exoplanet course at UCL, UK. **February 2021**

— *Exoplanets and Ocean Worlds*- Invited lecturer in oceanography, Diablo Valley College, CA. **March 2021**

Professional service

— Reviewer for the Astrophysical Journal. **2023**
— Chair of the astronomy session at the CEC 2024 Conference **September 2024**
— Chair of the Real-Time Control session at the CfAO Fall Retreat **November 2024**

Diversity equity and inclusion (DEI) service

— DEI UCSC postdoc representative in the Astronomy department **2024-2025**
— Facilitator of women circles : ∼ 150 women, mainly in Africa and Asia ; **Since 2023**
— Member of the 2024 Yokohama SPIE conference DEI board, leading a workshop : "Astronomy for All : highlights of science and tech development in emerging countries" ; **June 2024**
— FLASH Talk at UC Santa Cruz "How to develop science and technology in emerging countries - a few African and Southeast Asian examples". **May 2024**
— Volunteer mentor through the French program dema1n.org that connects professionals with young adults for their professional development. **since 2023**
— Journey Through The Universe, Big Island. **2018, 2021, 2022**

Selected media coverage

— Featured several times in the La Provence French Newspaper (link 1, link 2).
— Featured in the Le Dauphiné French Newspaper link 1.
— Featured in the CNRS French Research News page link 1.
— Featured in RFI Brazil link 1.
— Research results featured in Sci News, NASA, Discover Magazine, Spaceref.com, and more.
— Featured in The Double Blind Magazine about the 2024 total eclipse (link).

5 Observing experience

∼ 3 years of engineering and science nights with the SCExAO instrument at the Subaru Telescope.

Accepted proposal :

— HD 149162 and LkCa 15"Investigating planet formation in two benchmark transitional disks" (PI : N. Skaf, S21B)

6 SCIENTIFIC CONFERENCES

Conference talks

- Congresso Espacial Centroamericano, Guatemala - September 2024, "Stars and exoplanets for All : Citizen Science and the Democratization of Astronomy at a time of climate change."
- Other World Laboratories Summer Program, UCSC - July 2024 "DrWHO and Real time control - seeing the invisible."
- Congresso Espacial Centroamericano - September 2023, Costa Rica : "Astronomy and space for all - how to develop science and technology in emerging countries : a few African and Southeast Asian examples. "
- SPIE Astronomical Telescope + Instrumentation - Montreal - July 2022 "Imaged-based adaptive optics wavefront sensor referencing for high contrast imaging."

- Lyot Conference - Leiden - July 2022 “High contrast imaging wavefront sensor referencing from coronagraphic images.”
- Wavefront sensing in the VLT/ELT era VII - Dec 2021 “High contrast imaging wavefront sensor referencing from coronagraphic images.”
- SPIE Optics and Photonics - Techniques and Instrumentation for Detection of Exoplanets X - Aug 2021 “High contrast imaging wavefront sensor referencing from coronagraphic images.”
- Direct Imaging Tech Talk Feb. 2021 : “Image-base adaptive optics wavefront sensor referencing : a method to compensate NCPA”
- ARES Day - Nov 2020 : “Diaries from TauREx.”
- Ariel Consortium Meeting Oct. 2020 : “Unveiling the atmospheric compositions of the hot Jupiters WASP-127b, WASP-79b, WASP-62b.”
- WFS 2020- Oct. 2020 : “Dr WHO : a self-automatisation algorithm for high contrast imaging.”
- EPSC Sept. 2020 : “ARES. II. Characterizing the Hot Jupiters WASP-127 b, WASP-79 b, and WASP-62b with the Hubble Space Telescope”

Journal Club

- LESIA’s Astro-café : “Introduction to Machine Learning and Pushing the limits of exoplanets discovery via Direct Imaging.”

Initiator & organiser of the 1st international workshop on AI for AO - 3 days May 2020 : 40 participants, 9 universities worldwide.

7 ASSOCIATIONS, HOBBIES, LANGUGES

Associations : French Association of Women and Sciences ; French Society of Astronomy ; Space Bus France. Honorary member of the association ”Guyane Astronomie”.

Travels : Europe, Asia, Africa, North, Central and South America, Oceania. ∼50 countries.

Photography : landscapes and night sky pictures.

Languages : French (mother tongue). English (bilingual). Spanish, Italian, Arabic (beginner to intermediate).

Hobbies : Yoga teacher in training. Outdoor sports, scuba diving (PADI open water), free diving, surfing.

PUBLICATION LIST

Total of 62 publications as main author and co-author, 1369 citations, h-index 18, as of October 2024 on **Google Scholar**

1 MAJOR REFEREED PUBLICATIONS

1. **Skaf, N.** ; Boccaletti, A. ; Pantin, E. et al. (**2023**), *The β Pictoris system: Setting constraints on the planet and the disk structures at mid-IR wavelengths with NEAR*, Astronomy and Astrophysics, 675, A35, DOI Link, 9 citations
2. **Skaf, N.** ; Guyon, O. ; Gendron, É. et al. (**2022**), *On-sky validation of image-based adaptive optics wavefront sensor referencing*, Astronomy and Astrophysics, 659, A170, DOI Link, 10 citations
3. **Skaf, N.** ; Bieger, M. F. ; Edwards, B. et al. (**2020**), *ARES. II. Characterizing the Hot Jupiters WASP-127 b, WASP-79 b, and WASP-62b with the Hubble Space Telescope*, The Astronomical Journal, 160, 109, DOI Link, 69 citations

2 OTHER REFEREED PUBLICATIONS

1. Dykes, E.; Currie, T; Lawson, K. et al. (**2024**), *SCExAO/CHARIS Near-Infrared Scattered-Light Imaging and Integral Field Spectropolarimetry of the AB Aurigae Protoplanetary System*, AAS Journal, DOI Link
2. El Morsy, M. et al. (**2024**), *Dynamical and Atmospheric Characterization of the Substellar Companion HD 33632 Ab from Direct Imaging, Astrometry, and Radial-Velocity Data*, AAS Journal DOI Link, 1 citation
3. Tobin, T. L. ; Currie, T. ; Li, Y. et al. (**2024**), *Direct-imaging Discovery of a Substellar Companion Orbiting the Accelerating Variable Star HIP 39017*, The Astronomical Journal, 167, 205, DOI Link, 8 citations
4. Whiteford, N. ; Glasse, A. ; Chubb, K. L. et al. (**2024**), *Correction to: Retrieval study of cool, directly imaged exoplanet 51 Eri b*, Monthly Notices of the Royal Astronomical Society, 528, 6221, DOI Link
5. Changeat, Q. ; Skinner, J. W. ; Cho, J. Y. -K. et al. (**2024**), *Is the Atmosphere of the Ultra-hot Jupiter WASP-121 b Variable?*, The Astrophysical Journal Supplement Series, 270, 34, DOI Link, 8 citations
6. Edwards, B. ; Changeat, Q. ; Tsiaras, A. et al. (**2023**), *Exploring the Ability of Hubble Space Telescope WFC3 G141 to Uncover Trends in Populations of Exoplanet Atmospheres through a Homogeneous Transmission Survey of 70 Gaseous Planets*, The Astrophysical Journal Supplement Series, 269, 31, DOI Link, 41 citations

7. Edwards, B. ; Changeat, Q. ; Tsiaras, A. et al. (**2023**), *Characterizing a World Within the Hot-Neptune Desert: Transit Observations of LTT 9779 b with the Hubble Space Telescope/WFC3*, The Astronomical Journal, 166, 158, DOI Link, 10 citations
8. Whiteford, N. ; Glasse, A. ; Chubb, K. L. et al. (**2023**), *Retrieval study of cool, directly imaged exoplanet 51 Eri b*, Monthly Notices of the Royal Astronomical Society, 525, 1375, DOI Link, 18 citations
9. Vievard, S. ; Huby, E. ; Lacour, S. et al. (**2023**), *Single-aperture spectro-interferometry in the visible at the Subaru telescope with FIRST: First on-sky demonstration on Keho'oea (α Lyrae) and Hokulei (α Aurigae)*, Astronomy and Astrophysics, 677, A84, DOI Link, 2 citations
10. Ahn, K. ; Guyon, O. ; Lozi, J. et al. (**2023**), *Combining EFC with spatial LDFC for high-contrast imaging on Subaru/SCExAO*, Astronomy and Astrophysics, 673, A29, DOI Link, 7 citations
11. Currie, T. ; Brandt, G. M. ; Brandt, T. D. et al. (**2023**), *Direct imaging and astrometric detection of a gas giant planet orbiting an accelerating star*, Science, 380, 198, DOI Link, 39 citations
12. Steiger, S. ; Brandt, T. D. ; Guyon, O. et al. (**2022**), *Probing Photon Statistics in Adaptive Optics Images with SCExAO/MEC*, The Astronomical Journal, 164, 186, DOI Link, 3 citations
13. Swimmer, N. ; Currie, T. ; Steiger, S. et al. (**2022**), *SCExAO and Keck Direct Imaging Discovery of a Low-mass Companion Around the Accelerating F5 Star HIP 5319*, The Astronomical Journal, 164, 152, DOI Link, 9 citations
14. Kuzuhara, M. ; Currie, T. ; Takarada, T. et al. (**2022**), *Direct-imaging Discovery and Dynamical Mass of a Substellar Companion Orbiting an Accelerating Hyades Sun-like Star with SCExAO/CHARIS*, The Astrophysical Journal, 934, L18, DOI Link, 39 citations
15. Currie, T. ; Lawson, K. ; Schneider, G. et al. (**2022**), *Images of embedded Jovian planet formation at a wide separation around AB Aurigae*, Nature Astronomy, 6, 751, DOI Link, 117 citations
16. Lawson, K. ; Currie, T. ; Wisniewski, J. P. et al. (**2021**), *Multiband Imaging of the HD 36546 Debris Disk: A Refined View from SCExAO/CHARIS*, The Astronomical Journal, 162, 293, DOI Link, 9 citations
17. Chilcote, J. ; Tobin, T. ; Currie, T. et al. (**2021**), *SCExAO/CHARIS Direct Imaging of A Low-mass Companion At A Saturn-like Separation from an Accelerating Young A7 Star*, The Astronomical Journal, 162, 251, DOI Link, 6 citations
18. Mugnai, L. V. ; Modirrousta-Galian, D. ; Edwards, B. et al. (**2021**), *ARES. V. No Evidence For Molecular Absorption in the HST WFC3 Spectrum of GJ 1132 b*, The Astronomical Journal, 161, 284, DOI Link, 52 citations
19. Guilluy, G. ; Gressier, A. ; Wright, S. et al. (**2021**), *ARES IV: Probing the Atmospheres of the Two Warm Small Planets HD 106315c and HD 3167c with the HST/WFC3 Camera*, The Astronomical Journal, 161, 19, DOI Link, 30 citations

20. Lawson, K. ; Currie, T. ; Wisniewski, J. P. et al. (**2020**), *SCExAO/CHARIS Near-infrared Integral Field Spectroscopy of the HD 15115 Debris Disk*, The Astronomical Journal, 160, 163, DOI Link, 18 citations
21. Pluriel, W. ; Whiteford, N. ; Edwards, B. et al. (**2020**), *ARES. III. Unveiling the Two Faces of KELT-7 b with HST WFC3*, The Astronomical Journal, 160, 112, DOI Link, 44 citations
22. Edwards, B. ; Changeat, Q. ; Baeyens, R. et al. (**2020**), *ARES I: WASP-76 b, A Tale of Two HST Spectra*, The Astronomical Journal, 160, 8, DOI Link, 73 citations
23. Currie, T. ; Marois, C. ; Cieza, L. et al. (**2019**), *No Clear, Direct Evidence for Multiple Protoplanets Orbiting LkCa 15: LkCa 15 bcd are Likely Inner Disk Signals*, The Astrophysical Journal, 877, L3, DOI Link, 82 citations
24. Currie, T. ; Brandt, T. D. ; Uyama, T. et al. (**2018**), *SCExAO/CHARIS Near-infrared Direct Imaging, Spectroscopy, and Forward-Modeling of κ And b: A Likely Young, Low-gravity Superjovian Companion*, The Astronomical Journal, 156, 291, DOI Link, 56 citations
25. Currie, T. ; Kasdin, N. J. ; Groff, T. D. et al. (**2018**), *Laboratory and On-sky Validation of the Shaped Pupil Coronagraph's Sensitivity to Low-order Aberrations With Active Wavefront Control*, Publications of the Astronomical Society of the Pacific, 130, 044505, DOI Link, 17 citations

3 MAJOR CONFERENCE PROCEEDINGS

1. **Skaf, N.** et al. (**2024**), *Real-time control and data standardization on various telescopes and benches*, SPIE, DOI Link
2. **Skaf, N.** ; Guyon, O. ; Boccaletti, A. et al. (**2022**), *Imaged-based adaptive optics wavefront sensor referencing for high contrast imaging*, Adaptive Optics Systems VIII, 12185, 121851U, DOI Link
3. **Skaf, N.** et al. (**2021**), *High contrast imaging wavefront sensor referencing from coronagraphic images*, SPIE, DOI Link

4 OTHER CONFERENCE PROCEEDINGS

1. El Morsy, M. ; Currie, T. ; Kuzuhara, M. et al. (**2024**), *Design, scientific goals, and performance of the SCExAO survey for planets around accelerating stars*, Adaptive Optics Systems IX, 13097, 130977I, DOI Link
2. Ahn, K. ; Guyon, O. ; Lozi, J. et al. (**2022**), *Laboratory demonstrations of EFC and spatial LDFC on Subaru/SCExAO*, Adaptive Optics Systems VIII, 12185, 121852B, DOI Link
3. Deo, V. ; Vievard, S. ; Cvetojevic, N. et al. (**2022**), *Controlling petals using fringes: discontinuous wavefront sensing through sparse aperture interferometry at Subaru/SCExAO*, Adaptive Optics Systems VIII, 12185, 121850Z, DOI Link, 1 citation
4. Guyon, O. ; Norris, B. ; Martinod, M. -A. et al. (**2022**), *High contrast imaging at the photon noise limit with WFS-based PSF calibration*, Adaptive Optics Systems VIII, 12185, 121850E, DOI Link, 2 citations
5. Guyon, O. ; Ahn, K. ; Akiyama, M. et al. (**2022**), *High contrast and high angular imaging at Subaru Telescope*, Adaptive Optics Systems VIII, 12185, 121856J, DOI Link
6. Lucas, M. ; Bottom, M. ; Guyon, O. et al. (**2022**), *A visible-light Lyot coronagraph for SCExAO/VAMPIRES*, Ground-based and Airborne Instrumentation for Astronomy IX, 12184, 121844E, DOI Link, 2 citations
7. Vievard, S. ; Ahn, K. ; Arriola, A. et al. (**2021**), *Very high resolution spectro-interferometry with wavefront sensing capabilities on Subaru/SCExAO using photonics*, Techniques and Instrumentation for Detection of Exoplanets X, 11823, 118230C, DOI Link, 1 citation
8. Currie, T. ; Brandt, T. D. ; Kuzuhara, M. et al. (**2021**), *A new type of exoplanet direct imaging search: a SCExAO/CHARIS survey of accelerating stars*, Techniques and Instrumentation for Detection of Exoplanets X, 11823, 1182304, DOI Link, 9 citations
9. Ahn, K. ; Guyon, O. ; Lozi, J. et al. (**2021**), *SCExAO: a testbed for developing high-contrast imaging technologies for ELTs*, Techniques and Instrumentation for Detection of Exoplanets X, 11823, 1182303, DOI Link, 2 citations
10. Deo, V. ; Vievard, S. ; Cvetojevic, N. et al. (**2021**), *Wavefront sensing using non-redundant aperture masking interferometry: tests and validation on Subaru/SCExAO*, Techniques and Instrumentation for Detection of Exoplanets X, 11823, 118231A, DOI Link
11. Guyon, O. ; Norris, B. ; Martinod, M. -A. et al. (**2021**), *High contrast imaging at the photon noise limit with self-calibrating WFS/C systems*, Techniques and Instrumentation for Detection of Exoplanets X, 11823, 1182318, DOI Link, 4 citations
12. Guyon, O. ; Sevin, A. ; Ferreira, F. et al. (**2020**), *Adaptive optics real-time control with the compute and control for adaptive optics (Cacao) software framework*, Adaptive Optics Systems VII, 11448, 114482N, DOI Link, 1 citation

13. Guyon, O. ; Lozi, J. ; Vievard, S. et al. (**2020**), *Validating advanced wavefront control techniques on the SCExAO testbed/instrument*, Adaptive Optics Systems VII, 11448, 114481Z, DOI Link, 1 citation

14. Currie, T. ; Guyon, O. ; Lozi, J. et al. (**2020**), *On-sky performance and recent results from the Subaru coronagraphic extreme adaptive optics system*, Adaptive Optics Systems VII, 11448, 114487H, DOI Link, 18 citations

15. Vievard, S. ; Bos, S. P. ; Cassaing, F. et al. (**2020**), *Focal plane wavefront sensing on SUBARU/SCExAO*, Adaptive Optics Systems VII, 11448, 114486D, DOI Link, 3 citations

16. Clergeon, C. ; Minowa, Y. ; Guyon, O. et al. (**2018**), *Subaru AO188 upgrade phase 1: integration of the new real-time system*, Adaptive Optics Systems VI, 10703, 1070337, DOI Link

17. Guyon, O. ; Sevin, A. ; Gratadour, D. et al. (**2018**), *The compute and control for adaptive optics (CACAO) real-time control software package*, Adaptive Optics Systems VI, 10703, 107031E, DOI Link, 8 citations

18. Lozi, J. ; Guyon, O. ; Jovanovic, N. et al. (**2018**), *SCExAO, an instrument with a dual purpose: perform cutting-edge science and develop new technologies*, Adaptive Optics Systems VI, 10703, 1070359, DOI Link, 16 citations

19. Sahoo, A. ; Guyon, O. ; Clergeon, C. S. et al. (**2018**), *Subaru Coronagraphic Extreme-AO (SCExAO) wavefront control: current status and ongoing developments*, Adaptive Optics Systems VI, 10703, 1070350, DOI Link, 2 citations