Section b: Curriculum vitae and Track Record

High energy astrophysics, specialist on multi-messenger characterization of compact objects

PERSONAL DETAILS

Antier Sarah, Born 1990, French
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I allocate my creativity and passion to gravitational-wave astronomy and the study of compact objects. I want to harness this complex ecosystem within the field to enable scientific opportunities, transcending the boundaries between nuclear, gravitational-wave physics, astrophysics, and cosmology. I have enriched my expertise in multiple research areas with the bridges I have built between collaborators and tools, and I enrich this community in return. I started research with a PhD focusing on the astrophysics of GRBs and their detection in the *SVOM* mission, with a particular interest in their possible connection with binary neutron star mergers. I became interested in gravitational waves from these events and joined the Virgo collaboration at the end of my PhD. One year after, GW170817 occurred, opening up the new field of multi-messenger astronomy. I actively participated in its scientific exploitation by interfacing multiple messengers to better identify the global astrophysical scenario. In 2018, I proposed my own solution, GRANDMA, a new community interacting with observations by a worldwide telescope network. In 2020, I opened access to `Skyportal` to Europe, a science platform to manage time-domain alerts. I am now working at Paris-Saclay, where I can reconcile data science, astrophysics, and gravitational-wave research to study compact objects.

- **Education and key qualifications**

2013 - 2016	**PhD in High-Energy Astrophysics of University Paris-Saclay**, *CEA Saclay*, France. Advisors F. Daigne and S. Schanne, Detection of Gamma-Ray Bursts with SVOM/ECLAIRs.
2012 - 2013	**Master of Astrophysics**, *University Strasbourg*, France. Equivalent to MSc. Thesis P. Ferrando and O. Limousin
2010 - 2013	**Engineering degree**, Télécom Physique Strasbourg, *University Strasbourg*, France.

- **Current position(s)**

2025 -	**CNAP Astronome-Adjoint eq. Assistant Prof.**, *University Paris-Saclay*, IJCLAB, France.

- **Previous position(s)**

2021 - 2025	**CNAP Astronome-Adjoint**, *Observatoire de la Côte d'Azur*, Artemis, France.
2021	**Postdoctoral Researcher**, GRAPPA, *Université d'Amsterdam*, Netherlands.
2018 – 2021	**Postdoctoral Prize Researcher**, CNES-CNRS/APC, *Université de Paris*, France.
2016 -	**International and national invited visits**, *USA, China, Europe*. I had regular international visits to promote my research at NAOC, Univ. of Amst., Univ. of Minnsota., Univ. of Postdam., and several CNRS labs inc. LAM, CPPM, IRAP
2016 – 2018	**Postdoctoral Researcher**, CNRS/IN2P3, LAL, *Université de Paris-Saclay*, France.

RESEARCH ACHIEVEMENTS AND PEER RECOGNITION

- **Research achievements**

1. M. Kasliwal .. **S. Antier** .. D. Akl, "ZTF25abjmnps (AT2025ulz) and S250818k: A Candidate Superkilonova from a Subthreshold Subsolar Gravitational-wave Trigger", AJ, vol. 995, no. 2, Art. no. L59, IOP, Dec 2025. doi:10.3847/2041-8213/ae2000 (photometry observations and analysis, writing, reviewing) - This very recent ZTF article explores various scenarios of ejecta properties to explain a potential multi-messenger association between the optical transient AT2025ulz and the sub-solar mass merger

S250818k, the first ever event candidate of this kind released in a gravitational-wave campaign. This article constitutes the first milestone in exploring the use of observations of more exotic GW counterpart signatures. (2 citations)

2. M. Pillas, **S. Antier** et al., Limits on the Ejecta Mass and Binary Properties During the Search for Kilonovae Associated with Neutron Star-Black Hole Mergers, PhRvD, 112, Oct. 2025, doi:10.1103/6ld6-95xh (co-coordinator, methodology, analysis of ejecta mass of NS-BH) - This is a key collaboration article for results of the O4a follow-up campaign by nine collaborations (the only article up to date with such participation). I constrained properties of kilonova counterparts to NS-BH GW candidates based on optical observations and GW public information. (15 citations)

3. T. Hussenot-Desenonges, T. Wouters, N. Guessoum, I. Abdi, A. Abulwfa .. **S. Antier** et al. "Multi-band analyses of the bright GRB 230812B and the associated SN2023pel", MNRAS, 530, 1, May 2024. (Supervision of the first author, methodology, and analysis of optical data). This GRANDMA collaboration article focuses on GRB 230812B, one of the best observed afterglows with a distinctive supernova bump. I measured properties of the jet (opening angle, energy) and made a comparison with known core collapse supernovae (23 citations)

4. The LIGO Scientific Collaboration, the Virgo Collaboration, the KAGRA Collaboration, including **S. Antier** et al."GWTC-3: Compact Binary Coalescences Observed by LIGO and Virgo During the Second Part of the Third Observing Run" PhRvX, 13, 041039., December 2023, doi:10.1103/PhysRevX.13.041039. (member of the paper writing team, main contribution on the section related to alerts). This is the main article of the LIGO-Virgo-Kagra collaboration presenting the third catalog of GW events detected so far. (2604 citations)

5. M. W. Coughlin, J. S Bloom, G. Nir, **S. Antier**, T. Du Laz, T. Culino et al. "A Data Science Platform to Enable Time-domain Astronomy" ApJS, 267, 31, Aug 2023.doi:10.3847/1538-4365/acdee1 (coordinator for Europe and European leader of SkyPortal). This is a methodology paper that describes SkyPortal, a unique scientific platform specifically designed for the study of multi-messenger events, currently used by over 400 users worldwide and funded by both Europe and the United States. Of the 47 co-authors on the associated publication, approximately 30% are engineering students from French institutions who contributed under my supervision. (81 citations)

6. D. A Kann, S. Agayeva, ... **S. Antier**, et al. "GRANDMA and HXMT Observations of GRB 221009A: The Standard Luminosity Afterglow of a Hyperluminous Gamma-Ray Burst—In Gedenken an David Alexander Kann" ApJL, 948, L12, May 2023. doi:10.3847/2041-8213/acc8d0 (main coordinator after the loss of D. Kann, methodology, analysis of the data). This collaboration discovery paper by GRANDMA and HXMT focuses on GRB 221009A, the most energetic GRB recorded to date. In this article, I use two different frameworks to explain the jet properties and conclude that more processes are at play beyond synchrotron radiation at the forward external shock during the deceleration of a top-hat relativistic jet by a uniform medium. I obtained an optical upper-limit during the prompt emission. (53 citations)

7. T. Dietrich, M. W. Coughlin, . . . **S. Antier**, et al., Multi-messenger constraints on the neutron-star equation of state and the Hubble constant, Science (IF 41.9), 370, 1450, Dec 2020. doi:10.1126/science.abb4317 (methodology, editing, and review of the article) – This methodology article is centered on the multi- messenger framework, which combines multiple observations to constrain the masses and radii of neutron stars, and reveal their equation of state. (501 citations)

8. M. W. Coughlin, **S. Antier**, T. Dietrich, R. J. Foley, J. Heinzel, M. Bulla, N. Christensen, et al., Measuring the Hubble constant with a sample of kilonovae., Nature Communications (IF 12.1) 11, 4129, August 2020. https://doi.org/10.1038/s41467-020-17998-5 (initiate the work) – This is a phenomenology article detailing the full procedure for standardizing a subset of kilonovae, based on brightness and color evolution, to be used as standardizable candles. (65 citations)

9. **S. Antier**...K. Barynova...B. Chabert...P.A Duverne...Z. Vidadi et al., GRANDMA Observations of Advanced LIGO's and Advanced Virgo's Third Observational Campaign, 2020, MNRAS (IF 5.4), 497, 5518, June 2020, (main author) This is an observational article with my master and PhD students, summarizing the full scientific activity and upper limits of the GW counterpart made by the GRANDMA consortium during the third gravitational-wave observing campaign. (107 citations)

10. B. P. Abbott, R. Abbott, et al, LIGO-Virgo collaboration, Multi-messenger Observations of a Binary Neutron Star Merger., Astrophysical Journal (IF 7.3), 848: L12, Oct 2017 (contribution to sections related to γ-rays, X-rays et UVOIR of GW170817) – This captone article of multi-messenger observations with gravitational waves, signed by the LIGO-Virgo and 70 astronomical groups (3200 citations).

- **Peer recognition**

Publications, communications, observations

- 109 articles in peer review (60 000 citations, H-index=85) with 30 with sign. contribution over the last 5 years
- 21 oral contributions, 10 invited, 11 seminars
- Expertise in optical photometry, detectability of new sources in wide field, and γ-ray analysis
- Program PI: **GRANDMA**, Co-I of **Virgo**, **TAROT**, co-I of **SVOM**, co-I of **Colibri**, co-I of **ASTEP**

Prize and awards

2025	Minor-planet 1998 UJ16 is named "Sarahantier" discovered by TAROT, IAU WGSBN Bulletin
2025	Co-Laureate of the Gemini Pro-Amateur Prize given by the French astrophysical society, SF2A, France Yearly prize given to promote a citizen science program attributed here to "Kilonova-catcher" (KNC)
2023	Observatoire de Royan, France is "baptized" "Sarah Antier"
2018 - 2021	CNES Fellowship, CNES, Astroparticule and Cosmology Laboratory, APC, France for 2 years to conduct independent postdoctoral research, success rate 15% per year
2018	**For Women in Science, Oréal-Unesco**, France *visits to increase my research visibility, success rate 3%*

Elected academy membership

2023 - 2027	**Elected national member CNAP** of Corps National des Astronomes et des Physiciens In charge of the recruitment and promotion of professor associate CNAP astronomers in France)
2024	Examinator for Weijing Xie thesis (CEA, 2024)
2022, 2021	Member of the regional master thesis committee ("MAUCA"), Nice

Grants

2024 - 2028	Co-I ACME, HORIZON-INFRA-2023-SERV-01-02 with P. Hello and J. Peloton, Skyportal, 90 keuros
2022-2024	Principal co-investigatrice (with J. Bloom) Fund France-Berkeley, Skyportal, 10 keuros
2024	Local PI, Grant for TAROT (CNES/CNRS) with A. Klotz
2022	PI MITI CNRS financial support, $\sim$ 2x20 keuros, "Kilonova-catcher", France.
2022	PI investigator OCA-AUS project with N. Guessoum, 23 keuros, "Search for Kilonovae", Dubai
Before 2022	PI multiple grants as CSI-UCA, PNHE.

Scientific responsabilities

PI	2018-	International GRANDMA collaboration, 100 members, since 2018
Scientific chair	2024-	TAROT (management of data and scientific programs)
	2024, 2025	COLIBRI (management of science programs)
Collab. committee	2021-2022	Member of the ad-committee for organizing the human vetting on LIGO-Virgo alerts
	2018	Virgo liaison for the low-latency sub-group of the joint LVC data analysis group
SOC Conference	2026	100 part. Marseilles, Time-domain conference
	2022,2024	LIA ERIDANUS, 30 part., Mexico, Multi-messenger with GW
	2022, 2023	and Neutrinos, 30 part, Nice-2022, St-Lamberts, SOC & LOC, Strasbourg, SOC
Nati. prospect.	2024	Nominated member of the sub-group "moyens sol optique-IR" for the institute INSU
Articles		Reviewer for American Astro. Society, Month. Not. of the Royal Astron. Society Astro. and Astrophy., PASP, Physic. Rev. Letters

Student supervision in the last five years

Postdoc	M. Pillas (20%, 2024, OCA, informal) and (10%, 2025, Univ Lièges, informal) Kilonovae during the O4 GW campaign
PhD students	A. Jacquesson (50 % with P. Hello, 20/25-28), D. Akl (30% remote NYUAD, 20/24-28) Characterisation on fast transients with Vera Rubin T. Hussenot and P-A. Duverne (50 % with P. Hello, 2022 - 2025/2019-2022) Localization and photometric characterization of GW and GRB sources
Engineer	C. Douzet (15 % in 2025 with J. Peloton, informal) for ACME on Skyportal
Under/graduate	Pres. and remote, D. Akl, AUS (40 % in 2023/24 as undergrad)
PhD summer projects	C. Andrade (UMN), V. Rupchandani (AUS) Z. Vidadi, S. Agayeva (ShAO) (100 %, 2 months, 2021-2022) On GRANDMA scientific exploitation campaign on GRB and GWs
Master 2 students	J. Dibasso, T. Bonzi, A. Le Calloch (20 % with T. DuLaz, M. Coughlin, J. Bloom, 5 months, 2024) on Skyportal K. Barynova (100 %, 4 years L2/M2) on GRB analysis
Master 1 students	3 months, S. Pormente (50 % with T. Guillot, 2023), M. Pilloix (100 %, 2022) Photometry data reduction with TAROT and ASTEP T. Culino (100 %, 5 months, 2022) on Skyportal development
Licence student	K. Andreze Louison (50 % with O. Suarez, 2022) on Kilonova-catcher guide

Additional Information

- **Career breaks, diverse career paths and major life events**

2020	Half-time child-care during COVID-19 confinement period and beyond (5 months).
2018	Maternity leave for 4 months.

- **Other contributions to the research community**

Service Task as CNAP Astronomer (Tâche de service). It is a special duty for "French CNAP Astronomer" in replacement to some fraction of teaching duties made by professors. This duty is assigned to an instrument and aims to provide a service to the community. See more in https://cnap.obspm.fr/.

- Current, **SVOM, ANO2, 30%** Multi-messenger activities with SVOM and Virgo, Colibri data processing and Burst Advocate (resp. B. Cordier)
- 2021 - 09.2024, **Virgo, ANO3, 30%** Definition of the gravitational waves Virgo alerts and improvement on the indicator related to the ejecta mass during mergers (2022-2024) supervision of the alerts, tools for follow-up (2020-2022, resp. M. Boer then M. Bizouard)

Teaching activities since CNAP astronome adjointe (eq Professor associate)

2025-2026	**Physics internship Undergrads** Responsible, 23h/yr **Paris-Saclay University** **Computing Undergrads** for Numerical tools in Physics, Lab, 40h/yr **Paris-Saclay University**
2025	**Master 1 MAUCA**, GW astronomy lecture, 9h/yr **Observatoire de la Côte d'Azur**
2025 - 2024	**Computing undergraduate**, Data science, 20h/yr **Paris-Saclay University**
2025 - 2022	**Physics undergraduate** Lecture of Gravitational waves, 9h/year **Université Côte d'Azur**
2024 - 2022	**Maths undergraduate**, "Math tools" lecture university start, 16h/yr **Université Côte d'Azur** **Compution undergrads**, Lab, "info-web", 32h/yr, python
2021 - 2023	**Engineering Projects in M1 and M2**, 9 students UE, $\sim$ 15 weeks, **Skyportal**, **ESILV** France.
2022	**Telescope observation training**, 18h, Calern Observatory, OCA

Societal impact (some exemples)

Radio	RFI, France Culture (2023)
Public seminars	La Nuit des coupoles ouvertes 2022,2024, 4-6 ans and grand public (Calern) Grand Entretien (2023), Les Rencontres Ciel et Espace 2021 (Paris)
Citizen science	Kilonova-catcher (since 2019), Godmother of the Céphéides Club
Public publications	Ciel & Espace (2022), LaRecherche (2021, 2023), The conversation.fr (2017)