

## RESEARCH INTERESTS

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Binary compact collisions - Gravitational waves - Gamma-ray Bursts - Kilonovae - Multi-messengers

## EXPERIENCE

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**Post-doctoral CNRS/IN2P3 fellowship, APC, France** 1.03.2021 – 30.04.2021

**Postdoctoral CNES Prize fellowship, APC France** 01.12.2018 – 28.02.2021

Third observational campaign of gravitational-wave alerts (2019-2020).  
Responsible for Virgo activities (up to Sept 2019) related to alerts of gravitational-wave sources detected by Virgo and LIGO - PI of an international network of telescopes GRANDMA and co-I of the SVOM project to search for electromagnetic counterparts (GRB, kilonovae) of gravitational-wave events. Co-I of several time requests (ESO/VLT, Hubble), INTEGRAL, CFHT.

**Post-doctoral CNRS/IN2P3 fellowship, LAL, Orsay** 01.12.2016 – 30.11.2018

Second observational campaign of gravitational-wave alerts (2019-2020).  
In the framework of the LIGO/Virgo collaborations, contribution to the real-time validation of the gravitational-wave event candidates detected by Virgo and LIGO during the 2016-2017 campaign, and participation in the scientific exploitation. Observation of these alerts with the Chinese telescopes SVOM/GWAC.

**PhD in High Energy Astrophysics and Space, CEA Saclay** 01.10.2013 – 30.11.2016

SVOM mission.  
Design of embedded real-time algorithms and study of their performance (via a Monte Carlo model) for the detection and location of gamma-ray bursts that appear randomly in the sky. Use of machine learning methods and data mining.

## EDUCATION

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- **PhD in Astrophysics and Space instrumentation, Université Paris-Saclay** 2013–2016
- Master 2 Astrophysics, Université de Strasbourg 2012–2013
- Télécom Physique Strasbourg (ex ENSPS), Illkirch-Graffenstaden 2010–2013
- CPGE Maths and Physics section, Lycée Hoche, Versailles 2008–2010

## JOURNAL SERVICE

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Referee for *American Astronomical Society*, *Monthly Notices of the Royal Astronomical Society*

## RESPONSABILITIES

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- **PI of the GRANDMA collaboration** Since 2018
- Virgo liaison for the low latency sub-group of the joint LVC data analysis group 2018–2019

## SUPERVISION

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- Participation to the supervision of Pierre-Alexandre Duverne thesis with Patrice Hello, working on “Multi-messenger astronomy with GRANDMA and Virgo” 2019–2022
- Under-graduate supervisor of Katia Barynova 2017 (3 months), on short GRB detection with SVOM/ECLAIRs (L3). 2018 (3 months), on GRB detection with Fermi/GBM (M1). 2019 (3 months), on GRB detection with INTEGRAL SPI ACS (M2). 2017–2019
- Internship at level L3 and M1 et M2 Co-supervisor of Robin Marron, Benjamin Chabert Since 2017

## TEACHING

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- Teaching in Faculté Jean-Monnet, Université Paris-Sud Lessons on Microsoft Office and Macro programming to under-graduate students (64 hr/yr) 2013–2015

## GRANTS

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- Co-principal investigator of PNHE financial support for GRANDMA For missions, workshops and open science program, 11000 euros 2019–2021
- Co-investigator of DIM-ACAV financial support for GRANDMA 2-year postdoctoral fellowship (PI F. Daigne, IAP) for gravitational wave observational astrophysics 2021
- Co-investigator of ANR (submitted) financial support for multi-messenger astrophysics 430 000 euros (PI N. Christensen, OCA/Artemis) for a 3-year postdoctoral researcher and engineer for online computing and data processing of multi-messenger astrophysics 2021
- Co-principal investigator of Université de Paris financial support For citizen science program (plateform, communication on the project), 45 000 euros 2020–2023
- **l’Oréal-Unesco for Women in Science prize fellowship** 20 000 euros for scientific visits and conferences to enlarge my scientific research visibility 2018
- TS2020 co-principal investigator of PNHE financial support for TS2020 conferences (I and III) 2017 (3000 euros with N. Leroy, LAL) and 2019 (8000 euros with F. Daigne, IAP) 2017–2019
- Computing co-investigator of DIM-ACAV financial support for HENON 80 000 euros (PI G.Lavaux, IAP) for computer cluster for machine learning in Astronomy 2019

## OUTREACH

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- **Public lectures** Since 2019  
Talk-show at Salon Paris Air Show, CNES stand, professional and public days (June 2019)  
Public lecture on multi-messenger astronomy: Royan (June 2019, August 2020), Strasbourg (Sept 2019), St Remy Les Ch. (Dec 2019)
- **Citizen science:** participation of amateur astronomers with Université de Paris To the third observational campaign O3 with the “kilonova-catcher” initiated by GRANDMA Since 2019
- **Press publications** Since 2017  
On the GRANDMA project and my leadership, Les Echos, Oct 2019  
On gravitational-wave astronomy, Science et Avenir, Oct 2019  
« Mobilisation planétaire », on multi-messenger astronomy, laRecherche, Sept 2019  
« Le projet satellitaire SVOM au cœur de la coop. franco-chinoise », CNRS en Chine, Numéro 25, Sept 2017  
« A l’écoute des murmures de l’Univers », The conversation.fr, Nov 2017
- **Interviews** Since 2017  
Radio France Culture, Astronomie Multi-messagers avec M. Bizouard (Artémis), Nov 2020  
**Le Point, Interview,** ”La femme qui écoute l’univers“ Nov 2020

Ciel et Espace, Interview, 28 May 2019  
Global Press Telecon on LIGO-Virgo O3 updates, May  
Radio France Inter for the open science program, « Le club de la tête au carré », 5 Apr 2019  
Radio France Inter on GW10817 discovery, « Le club de la tête au carré », 24 Nov 2017  
Press conference of the GW170817 LIGO/Virgo discovery, LVC, China Oct 2017

## MAJOR PUBLICATIONS

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I am author of about 80 publications. I am author of 63 LIGO/Virgo publications, mostly connected to the second and third observational campaign of gravitational waves. I directly contributed to six of these LIGO/Virgo publications. I am author of 15 others publications, 2 proceedings and 1 comment related to gamma-bursts and the SVOM mission and multi-messenger studies with gravitational waves and kilonovae.

1. T. Dietrich, M. W. Coughlin, ... **S. Antier**, et al., Multimessenger constraints on the neutron-star equation of state and the Hubble constant, *Sci*, 370, 1450, Dec 2020. doi:10.1126/science.abb4317 (methodology, editing and review of the article)
2. 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., *Nat Commun* 11, 4129, August 2020. <https://doi.org/10.1038/s41467-020-17998-5> (initiate the work)
3. M. W. Coughlin, T. Dietrich, **S. Antier**, et al., Implications of the search for optical counterparts during the second part of the Advanced LIGO's and Advanced Virgo's third observing run: lessons learned for future follow-up observations, *Monthly Notices of the Royal Astronomical Society*, Volume 497, Issue 1, September 2020, Pages 1181–1196, <https://doi.org/10.1093/mnras/staa1925> (contribution to observation analysis used as inputs of numerical simulations)
4. **S. Antier**, et al., GRANDMA Observations of Advanced LIGO's and Advanced Virgo's Third Observational Campaign, 2020, *MNRAS*, 497, 5518, June 2020,(main author)
5. D. Turpin, M. Ganet, **S. Antier**, et al., Vetting the optical transient candidates detected by the GWAC network using convolutional neural networks, *MNRAS*, Volume 497, Issue 3, July 2020, Pages 2641–2650, <https://doi.org/10.1093/mnras/staa2046> (contribution to interpretation, supervisor of M. Ganet)
6. M. W. Coughlin, T. Dietrich, **S. Antier**, et al., Implications of the search for optical counterparts during the first six months of the Advanced LIGO's and Advanced Virgo's third observing run : possible limits on the ejecta mass and binary properties, *MNRAS*, Oct 2019 (contribution to observation analysis used as inputs of numerical simulations)
7. **S. Antier**, K. Barynova, P. Fryzlewicz et al., Detection of gamma-ray transients with wild binary segmentation, *MNRAS*, 493, 4428, Mars 2020 (main author - contribution to the data analysis)
8. **S. Antier**, S. Agayeva, V. Aivazyan, S. Alishov et al., The first six months of the Advanced LIGO's and Advanced Virgo's third observing run with GRANDMA., *MNRAS*, 492, 3904, Nov 2019 (main coordinator of the article, contribution to the summary of the observations)
9. M. W. Coughlin, T. Dietrich, J. Heinzel, N. Khetan, **S. Antier**, et al., Standardizing kilonovae and their use as standard candles to measure the Hubble constant, *PhRvR*, 2, 022006, April 2020 (contribution to the interpretation of the results)
10. M. W. Coughlin, **S. Antier**, et al., Optimizing Multi-Telescope Observations of Gravitational-Wave Counterparts, *MNRAS*, Volume 489, Issue 4, p5775–5783, Nov 2019 (contribution to the algorithm)
11. D. Turpin, C.Wu, X.H. Han, L.P. Xin, **S. Antier**, et al., The GWAC optical follow-up of the gravitational wave alerts. Results from the O2 campaign and prospects for the upcoming O3 run, *RAA*, Aug 2019 (contribution to the observations of gravitational waves alerts and on the writing part)
12. B. P. Abbott, R. Abbott, et al, **LIGO-Virgo collaboration**, Low-Latency gravitational waves alerts for multi-messenger astronomy during the second Advanced LIGO-Virgo run., *Astrophys.J.* 875 (2019) no.2, 161, Jan 2019 (main coordinator on behalf of the collaboration LIGO/Virgo, writing of the section related to the validation process of the gravitational wave alerts, their status and the follow-up activities done by the observers)

13. B. P. Abbott, R. Abbott, et al, **LIGO-Virgo collaboration**, GWTC-1: A Gravitational-Wave Transient Catalog of Compact Binary Mergers Observed by LIGO and Virgo during the First and Second Observing Runs., Phys. Rev. X 9, 031040, Sept 2019 (review and scientific coordination on multi-messengers aspects)
14. B. P. Abbott, R. Abbott, et al, **LIGO-Virgo collaboration**, Multimessenger Observations of a Binary Neutron Star Merger., Astrophysical Journal, 848: L12, Oct 2017 (contribution to sections related to gamma-rays, X-rays et UVOIR of GW170817)
15. B. P. Abbott, R. Abbott, et al, **LIGO-Virgo collaboration**, Estimating the Contribution of Dynamical Ejecta in the Kilonova Associated with GW170817., 850:L39, Dec 2017 (member of the paper writing team, synthesis of the observations of GW170817 and comparison with the brightness expected for the kilonova predicted by the models used in the article)
16. B. P. Abbott, R. Abbott, et al, **LIGO-Virgo collaboration**, GW170817 : Observation of Gravitational Waves from a Binary Neutron Star Inspiral. Physical Review Letters, 119(16):161101, Oct 2017 (contribution to the low latency Virgo validation process using the noise characterization tools developed at LAL for GW170817)
17. **S. Antier**, et al.,. Hard X-ray polarimetry with Caliste, a high performance CdTe based imaging spectrometer. Experimental Astronomy, 39 :233–258, Jun 2015
18. **S. Antier**, O. Limousin, and P. Ferrando. Fine pitch CdTe-based hard-X-ray polarimeter performance for space science in the 70-300 keV energy range. Nuclear Instruments and Methods in Physics Research A, 787 :297–301, July 2015

## MAJOR PRESENTATIONS

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### Invited presentations at conferences

- Talk – Low Latency gravitational waves alerts (on behalf of the LIGO/Virgo collab.), SCIOPS, Madrid, Nov 2019
- Talk – Multi-messenger science with Virgo (on behalf of the Virgo collab.), Asterics 2020, Groningen, March 2019
- Press media – Updates of the O3 campaign, on behalf of the Virgo collab., International Press Telecon, May 2019
- Talk – GW170817: Observation of GW from a BNS merger (for the LIGO/Virgo collab.), ESO, Jan 2018
- Press Conference – GW170817 Multi-messenger campaign, GW170817 China Press release, Oct 2017

### Other presentations at conferences

- Talk – Time Domain astronomy in the context of GW alerts, SVOM scientific revue, China, April 2017
- Talk – SVOM in the multi-messenger area (on behalf of SVOM), GWPAW, Annecy, May 2017
- Talk – Hard X-ray polarimetry with Caliste, a CdTe spectro-imager, NDIP, July 2014

### Invited international seminars and international workshops

- Talk – Coordinated the transient observations with GRANDMA, SNEWS collaboration, October 2020
- Seminar – GRANDMA and multi-messenger astronomy, ULB, Belgium, Sept 2020
- Seminar – Gravitational wave astronomy with GRANDMA, MPE, Germany, Oct 2019
- Seminar – Electromagnetic counterpart of Gravitational with GRANDMA and SVOM, UWM, USA, April 2019
- Talk – Multi-messenger astronomy with GRBs and GRANDMA, NASA Goddard, April 2019
- Talk – Sky localization and gravitational wave alerts, GW Open Data Workshop, Paris, April 2019
- Seminar – Gamma-ray bursts in multi-messenger area, IHEP, China, January 2019
- Seminar – GW170817 multi-messenger discovery, NAOC, CAS and Beijing Normal University, Oct 2017
- Seminar – SVOM GRB Sample and Multi-messenger astronomy, NAOC, China, April 2017
- Seminar – SVOM in the multi-messenger area (on behalf of SVOM), Cardiff University, Cardiff, June 2016
- Seminar – The SVOM mission and the GRB detection performance of ECLAIRs, NASA Goddard, USA, February 2016