Anais Möller

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Observational cosmology, multi-wavelength time-domain astronomy and machine learning

PI of Fink: selected broker to process the time-domain alert stream of Vera C. Rubin Observatory.
Lead of SuperNNova: open source machine learning light-curve classification framework.

Professional experience

09/2021 -	Swinburne University of Technology
	Multi-wavelength fast transients with DWF and developing Fink
	Contact: Jeff Cooke
04/2019 - 05/2021	CNRS, Laboratoire de Physique de Clermont
	Fink broker and Dark Energy Survey supernova cosmology
	Contact: Emmanuel Gangler
11/2015 - 02/2019	Australian National University, CAASTRO
	SkyMapper Transient Survey, Dark Energy Survey and OzDES supernova cosmology
	Promoted to Academic Level B 01/2018
	Contact: Brian Schmidt
11/2019	Support Astronomer: Anglo-Australian Telescope (AAT), SSO
	Observing and training with 2dF and AAOmega
	Contact: Chris Lidman

Education

2015	PhD, CEA Saclay, Université Paris Diderot (Sorbonne Paris)
	Detection and classification of supernovae for SNLS
	Supervisor: Vanina Ruhlmann-Kleider
2012	Master NPAC, Université Paris Diderot (Sorbonne Paris)
	awarded with Distinction
2011	Physics, Universidad Simón Bolívar, Venezuela.

Refereed Journal Articles

I have published **59 refereed papers** (4 as first-author). My publications have > 5,900 citations and I have an H-index of 26. I have also authored >110 ATels, TNS and GCN Notices.

Academic presentations

I have been invited to talk in 13 conferences and workshops, including a keynote talk at an ICLR workshop, a prestigious machine learning conference. I have been invited for 3 discussion panels and have 22 contributed talks on international events. I regularly present my work at institutions around the world.

Funding   CI Australia = Chief Investigator = PI or Principal Investigator in the US/French system

Grants:

2021-23: IN2P3/CNRS FINK broker	AUD 312,000
2020: LSSTCorp Enabling Science Grant Award	AUD 2,700
2019: Visiting Academic at University of Queensland, Australia (April-May 2019)	AUD 2,000
2018: DES Early Career Researcher travel grant	AUD 1,600
2017: IAU travel grant to attend IAU Symposium 339 in South Africa	AUD 1,500
2016: DES Early Career Researcher travel grant	AUD 1,600
2012-2015: PhD scholarship Université Paris Diderot	AUD 113,000
2020: Scientific Visitor at ESO Chile (March 2020)	accomodation+expenses

Telescope time	cost/night
2020: CFHT, 6h (CoI)	USD $\approx 25,000$
2017: Gemini, 7.5h (CoI)	USD $\approx 100,000$
2016-17: SkyMapper, Transient follow-up 50h (PI)	USD $\approx 1,000$
2015-17: SkyMapper, Supernova survey 437h good seeing + 540h bad seeing (PI)	USD $\approx 1,000$
2017-19: SkyMapper, Transient follow-up 10h (CoI)	USD $\approx 1,000$
2016-18: ANU 2.3m, Transient follow-up 800h (CoI)	USD $\approx 1,200$
2016: AAT, SNLS follow-up 3 nights (CoI)	USD $\approx 15,000$
2016: NTT ESO, ePESSTO+, ePESSTO, 750h (CoI)	USD $\approx 12,000$

Supervision

2020: Supervision of Erasmus master 2 internship, *Selection of peculiar SNe Ia*.
2016-18:Advisory panel and projects with PhD students Bonnie Zhang: *SN Ia cosmology* and Fiona Panther *high-energy and supernovae*.
2018: Supervision of undergraduate student, *SN2016doj, peculiar supernova found by SkyMapper*.
2017: Supervision of a science communication intern.
2017: Supervision of undergraduate student, *peculiar velocities with SMT SNe Ia.*
2016: Supervision of 5 summer undergraduate scholars in various SNe and SkyMapper projects.

Teaching

2017: Harley-Wood Winter School of Astronomy: invited contributor on optical transients.
2017: ANU Computer Science Honours Seminar.
2016,18: Invited Seminars on Observational Cosmology and Particle Physics in CeVale program.
2012-15: Université Paris-Sud XI (in French): full undergraduate courses and teaching assistant.
2006-10: Universidad Simón Bolívar (in Spanish): teaching assistant.

Professional leadership

FINK
• Principal Investigator and management team since its creation in 2019 with two collaborators. Now a collaboration >30 researchers and engineers over 7 countries.

CNRS IN2P3 decadal plan 2020:
• I co-authored 5 white papers of the French decadal plan on dark energy and artificial intelligence. I was invited as a panellist on artificial intelligence in fundamental research.

Rubin Observatory LSST Science Collaborations:
• I have an active role in the Dark Energy Science Collaboration (DESC) since 2019, was awarded with full membership in 2020 and I am currently part of the governance body Collaboration Council (2021-). Since 2020, I am also part of the Transients and Variable Stars Science Collaboration (TVS) and Informatics and Statistics Science Collaboration (ISSC).

Cosmology large surveys:
• I am an active member of major cosmological surveys in the world: Dark Energy Survey (DES), OzDES and SNLS. I have retained membership in DES throughout the years including as Continuing External Collaborator (2019-2020). I have been awarded with the permanent builder status in OzDES.

Transient large surveys:
• I led the SkyMapper Transient Survey supernovae (2016-2019) and optical counterparts for gravitational waves (PI until 2017). I am part of the multi-wavelength fast transient survey Deeper Wider Faster and collaborate with ESO large programmes PESSTO and extensions since 2015.

Associations:
• Since 2016 I am part of the Astronomical Society of Australia

Refereeing, Boards and Committees:
2017-2018 : SkyMapper telescope board.
2021 : Chair of organising committee for LSSTC enabling science 2021 broker workshop.
2020 : Chair of organising committee for LSSTC enabling science 2020 broker workshop.
2016-2018 : Colloquium committee at the Research School of Astronomy and Astrophysics, ANU.
2016-2018 : Distinguished Visitors committee at RSAA, ANU.
2017 : LOC The Astronomical Society of Australia (ASA) meeting.
2017 : LOC From Black Hole to Environment: Galaxy Evolution Across Multiple Wavelengths.
2016: Summer Scholars Selection Panel RSAA, ANU.
2016 : LOC SkyMapper Early Data Release: Maximizing Your Science.
2014-2015: Journal club organizer CEA Saclay.

Peer-reviewer for the journals *Science*, *Nature Astronomy* and *MNRAS*.
Opticon expert advisor (European Optical Infrared Co-ordination Network) in the 2017 round.
Internal reviewer for Supernova and Strong Lensing working groups in DES.

Community engagement

I engage with different audiences through talks, citizen science projects and media appearances.

In 2017, I was a CAASTRO Uluru Astronomer in Residence, two week outreach program with daily engagements with the general public at Uluru, Australia.

Talks and tours:
2020: Presentation in Spanish for the Astronomy group of the Central University (UCV) in Venezuela.
2019: Presentation in French for high school students at Université Clermont-Auvergne.
2016-2018: Open night talks at Mount Stromlo Observatory.
2016-2018: Guided tours (>5) in open nights at Mount Stromlo Observatory.
2016-2017: Starfest at Siding Spring Observatory, Australia: adult's and children's talk and guide.
2017: Presentation in French for high school students for Lycée Franco-Australien de Canberra.

Citizen science:

2018: Lead Supernova Sighting Zooniverse project featured in ABC Stargazing Live.
2017: Collaborator on Search for Planet 9 Zooniverse featured in BBC Stargazing Live.

Media:
2018: Invited to the Weekly Space Hangout (Youtube) by the team of Universe Today.
Multiple media appearances newspapers, radio podcasts, videos and internet media. Some selected appearances: Podcasts Radio: Astrophiz 2019, Aguacast 2019 (spanish), SBS Spanish 2018 (spanish). Newspapers: Sydney Morning Herald, Canberra Times.

Presentations

Invited talks in conferences and workshops in reverse chronological order

[1] Exploring the Transient Universe with the Nancy Grace Roman Space Telescope. February 2022.

[2] Journées PNHE. September 2021.

[3] 2021 Transient and EM Follow-Up Workshop OzGrav, Virtual 2020.

[4] Statistical Challenges in Modern Astronomy VII, Virtual Conference. June 2021.

[5] AI Benchmarking in Astrophysics, Virtual Workshop 2020.

[6] International Conference on Learning Representations (ICLR) workshop on Fundamental Science in the AI Era, Virtual Conference 2020. *Keynote speaker*

[7] Learning to discover: advanced pattern recognition in High-Energy Physics, France 2019.

[8] Workshop on Computational Intelligence in Remote Sensing and Astrophysics, Greece 2019.

[9] DES Collaboration Meeting plenary talk, Australia 2017.

[10] Cherenkov Telescope Array Australia : Multiwavelength Linkages Workshop, Australia 2017.

[11] ACAMAR 3: Australia-China Workshop on Astrophysics, Australia 2017.

[12] Mitchell Institute Workshop, USA 2017.

[13] Cherenkov Telescope Array Multiwavelength Linkages Workshop, Australia 2016.

Conference & workshop talks in reverse chronological order

[1] IAU Challenges and innovations in computational astrophysics, Virtual 2020.

[2] Dark Energy Colloquium, France 2020.

[3] Dark Energy Colloquium, France 2019.

[4] Supernova Cosmology Analysis Meeting, USA 2019.

[5] Artificial Intelligence in Astronomy ESO, Germany 2019.

[6] LSST Community Broker Workshop, USA 2019.

[7] Optimizing training samples for SN photometric classification, France 2019.

[8] European Week of Astronomy and Space Science, France 2019.
Understanding data: Visualisation, machine learning, and reproducibility

[9] European Week of Astronomy and Space Science, France 2019.
Exploring the time-domain phase space from current surveys to LSST

[10] LSST Asia, Australia 2019.

[11] Stars in Canberra UNSW, Australia 2018.

[12] European Week of Astronomy and Space Science, United Kingdom 2018.

[13] European Week of Astronomy and Space Science, United Kingdom 2018.

[14] Rencontres de Moriond, Italy 2018.

[15] IAU Symposium 339: Southern Horizons in Time-Domain Astronomy, South Africa 2017.

[16] Astronomical Society of Australia's Annual Scientific Meeting, Australia 2017.

[17] Kepler Space Telescope K2 Supernova Workshop, USA, January 2017.

[18] Supernovae through the Ages, Chile 2016.

[19] Diving into the Dark, Australia 2016.

[20] Statistical Challenges in Modern Astronomy, USA 2016.

[21] Photometric Classification Workshop, USA 2016.

[22] 11th Rencontres du Vietnam: 50 years after CMB discovery, Vietnam 2015.

Invited discussion panels

[1] International Conference on Learning Representations (ICLR) workshop on Fundamental Science in the AI Era, Virtual Conference 2020.

[2] Supernova Cosmology Analysis Meeting, USA 2019.

[3] GT09 Town Hall Meeting: Calcul, Algorithmes et Données. France 2019 (AI in fundamental research)

Invited seminars in reverse chronological order

Invited seminars with travel funding

[1] Cosmology and particle physics group, Nottingham University, United Kingdom (virtual) 2020.

[2] European Southern Observatory (ESO) Santiago. Chile 2020.

[3] Jodrell Bank Centre of Astrophysics, University of Manchester, United Kingdom 2019.

[4] Physics Department, University of Lancaster, United Kingdom 2019.

[5] School of Physics & Astronomy, Southampton University, United Kingdom 2018.

[6] Institute of Cosmology and Gravitation, Portsmouth University, United Kingdom 2018.

[7] Laboratoire de Physique de Clermont, Université Clermont-Auvergne, France 2018.

[8] Dunlap Institute for Astronomy & Astrophysics, University of Toronto. Canada 2018.

Other invited seminars in reverse chronological order

[1] LIneA, Brazil (virtual) 2021.

[2] University of Sheffield, UK (virtual) 2021.

[3] University of Adelaide, Australia (virtual) 2021.

[4] Minerva Seminar, Observatoire de Paris, France (virtual) 2021.

[5] Harvard & Smithsonian Center for Astrophysics. USA (virtual) 2020.

[6] Astronomy & Astrophysics Group, University College London (UCL). United Kindom 2018.

[7] Service de Physique de Particules (SPP) CEA Saclay, France 2018.

[8] AIM/ Cosmostat cosmology group, CEA Saclay, France 2018.

[9] Department of Physics, McGill University, Canada 2018.

[10] Laboratoire de physique nucléaire et de hautes énergies (LPNHE). France 2018.

[11] Institut d'Astrophysique de Paris (IAP), France 2018.

[12] Laboratoire Astroparticule et Cosmologie (APC), France 2018.

[13] African Institute for Mathematical Sciences (AIM), South Africa 2017.

[14] University of Cape Town (UCT), South Africa 2017.

[15] European Southern Observatory (ESO) Santiago, Chile 2016.