Doris Arzoumanian

Astrophysics – Filament paradigm for star formation – Observations / Data analysis / Theory

General Information

Name	Doris Arzoumanian
Date & place of birth	27th November 1985, Beirut, Lebanon
Nationality	Lebanese, French, and Armenian
Professional Address	Division of Science, National Astronomical Observatory of Japan 2-21-1 Osawa, Mitaka, Tokyo 181-8588, Japan
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Current Positions

From Sep. 2021 - Project Assistant Professor (NAOJ Fellow) at the National Astronomical Observatory of Japan
From Mar. 2022 - Faculty member at SOKENDAI (The Graduate University for Advanced Studies)

Research Expertise and Research Profile

– **Physics of the interstellar medium and Galactic scale star formation**
- Formation and evolution of filamentary molecular clouds
- Early stages of star formation from low- to high-mass stars
- Physical properties of molecular filaments and hubs, and their role in regulating star formation

– **Observations using space and ground-based telescopes in the submillimeter and millimeter wavelength**
- Observations with *Herschel*, *Planck*, Nobeyama-45m, IRAM-30m, APEX, JCMT, and ALMA
- Observations of dust and gas (continuum and spectroscopy), in total and polarized emission

– **Hybrid profile of an observer with skills in theoretical interpretation**
- Confronting observational results with numerical simulations and theoretical models

Research Positions

Nov. 2020 – Aug. 2021	Post-doctoral researcher at the Laboratoire d'Astrophysique de Marseille - LAM - **France**. Main research: *Impact of atomic and ionized bubbles on star formation.* Main publication: Arzoumanian, Russeil, Zavagno et al. 2022, A&A, 660, A56
Apr. 2019 – Jul. 2020	Post-doctoral researcher at Instituto de Astrofísica e Ciências do Espaço, Porto - **Portugal**. Main research: *Role of hub-filament systems in high-mass star formation.* Main publications: Kumar, Arzoumanian et al. 2022, A&A, 658, A114 Kumar, Palmeirim, Arzoumanian, Inutsuka 2020, A&A, 642, A87 Related publication: Arzoumanian and the BISTRO collaboration, 2021, A&A, 647, A78, 29
Nov. 2018 – Apr. 2019	Post-doctoral researcher at Nagoya University, **Japan**. Main research: *Theoretical investigation of filament fragmentation.* Main publication: Misugi, Inutsuka, Arzoumanian, 2019, ApJ, 881,10
Oct. 2016 – Sep. 2018	International Research Fellow of the Japan Society for the Promotion of Science (JSPS), at Nagoya University, **Japan**. Working in the "Laboratory for Theoretical Astrophysics" led by Shu-ichiro Inutsuka. Main research: *Theoretical interpretation of observed filament properties.* Main publication: Arzoumanian, Shimajiri, Inutsuka et al., 2018, PASJ, 70, 5, 96
Jan. 2016 – Aug. 2016	Post-doctoral researcher at Laboratoire d'Astrophysique-Instrumentation-Modélisation (AIM), Paris-Saclay - **France**. Working with Philippe André, as part of the ORISTARS ERC project. Main research: *Characterizing the observed properties of interstellar filaments.* Main publication: Arzoumanian, André et al., 2019, A&A, 621, A42
Jan. 2013 – Aug. 2015	Post-doctoral researcher at Institut d'Astrophysique Spatiale (IAS), Orsay - **France**. Working with François Boulanger, as part of the MISTIC ERC project. Main research: *Dust polarized emission observed by Planck towards interstellar filaments.* Main publication: Arzoumanian and the Planck collaboration, 2016, A&A, 586, A136

Publication Record

First authored publications: 16
9 refereed – 1027 citations – 7 conference proceedings

Total publications: 123
100 refereed – 8298 citations – 23 conference proceedings

Review chapter: 1
Review chapter in the Protostars and Planet VII Book: Pineda, Arzoumanian, et al. 2023, 534, 233 (link)

Education

November 2012 — **PhD degree in Astrophysics**, awarded by Université Paris-Diderot (Paris VII), France.
Research conducted at Laboratoire Astrophysique-Instrumentation-Modélisation, Paris-Saclay.
Advisor: Philippe André
Title: *Characterizing interstellar filaments as revealed by the Herschel Gould Belt survey: Insights into the initial conditions for star formation.*
Main publications: - Arzoumanian, André et al., 2013, A&A, 553, A119
- Arzoumanian and the HGBS collaboration, 2011, A&A, 529, L6

July 2009 — **Master's degree in Astrophysics**, Université Pierre et Marie Curie (Paris VI), France.
Thesis project conducted at the University of St Andrews. Advisor: Moira Jardin.
Title: *Coronal structure of AB Doradus and V374 Pegasi, X-ray and radio emissions.*
Main publication: Arzoumanian, Jardin et al., 2011, MNRAS, 410, 2472

June 2007 — **Bachelor's degree in physics**, Université Joseph Fourier, Grenoble.

June 2004 — High School Certificates (French and Lebanese Baccalaureate), Arslanian Djemaran, Lebanon.

Visiting Researcher (invited)

2023 — Max-Planck-Institute for Extraterrestrial Physics (Garching), Germany for **3 days**.
2020 — At Nagoya University, Nagoya, Japan for **3 months**.
2020 — At the National Astronomical Observatory, Tokyo, Japan for **2 weeks**.
2019 — At the Dominion Radio Astrophysical Observatory (Penticton), Canada for **2 weeks**.
2019 — At the Dominion Astrophysical Observatory (Victoria), Canada for **4 days**.

International Collaborations and Leading Roles

2023 – — **Initiated and leading the "Filament Working Group"** (FWG): An international working group of 50 researchers, aiming at understanding the role of filaments in star formation (combining observations and theory).
2022 – — Co-I of the star formation science groups of the LST and SCUBA3/POL3.
2021 – — Member of the European collaboration discussing the next generation IR space telescope.
2021 – — Member of "SURFING: SURveying Filaments In Nearby Gas clouds" **a large program with the JCMT/'$\overline{U}$'$\overline{u}$.**
Regional coordinator representing the team members in Japan (PI: M. Chen from Canada).
2020 – — Member of the **SKA** "Magnetism" and "Our Galaxy" Working Groups.
2019 – 2020 — Core member of the interstellar medium and star formation Science Working Groups (ISM/SF WG) of the **SPICA** Space Mission.
Co-led the science case "Large scale mapping of the Galactic ISM with SPICA".
2017 – — Member of "**CAFFEINE**: Core And Filament Formation/Evolution In Natal Environments" **a large program with APEX/ArTéMiS.**
Coordinating the analysis of the filamentary structures.
2017 – — Member of "**B-FUN**: Probing the B-Field in star-forming Filaments Using NIKA2-Pol" **a large program with the IRAM-30m/NIKA2-POL**.
2016 – — Member of "BISTRO: B-fields In STar forming RegiOns" **3 large programs with the JCMT/POL2**.
2013 – 2015 — Member of the *Planck* Collaboration.
2009 – — Member of the *Herschel* Gould Belt Survey (SPIRE SAG3) consortium.

Reviewing Activities

– Referee of the PhD thesis of Hideaki Takemura defended on January 23, 2023, SOKENDAI, Japan.
PhD thesis title: *Study of Dense Core Property and Core Mass Function with Simulation and Observation Data to Reveal the Core Growth with Observations.*
– Referee of the PhD thesis of Jean-Sébastien Carrière defended on June 27, 2022, at Université de Toulouse, France.
PhD thesis title: *Combined analysis of Herschel and Planck data; Correlations between filaments and the magnetic fields in star forming regions.*
– External referee for ALMA proposals since 2019.
– External referee for JCMT proposals since 2019.
– Referee for ApJ, A&A, MNRAS, PASJ, and Frontiers in Physics since 2013.
– Peer Review for STFC research grants (UK) as an expert in the star formation research field.

Organization of International Conferences

March 2024 — **Organizing** the *Magnetic fields from Clouds to Stars* international conference at NAOJ, Japan (Bfields2024)
May 2021 — Member of the **Scientific Organizing Committee** (SOC) of the international conference *Structure, characteristic scales, and star formation*, Beirut (virtual), (link)
June 2019 — Member of the **Scientific Organizing Committee** (SOC) of the international conference *Zooming in on star formation*, Nafplio, Greece (link)
November 2018 — **Main organizer (co-chair of SOC and chair of LOC) of the international conference** *Interstellar filament paradigm: On their formation, evolution, and role in star formation*
Nagoya University, Japan, 97 participants, 11 invited talks, 37 contributed talks, 39 posters (filament2018)

Observational Projects

Telescopes	Awarded observing time and Observing Sessions
JWST	Mid-IR observations with MIRI (Cycle 1 General Observers).
	Co-I of 1 accepted proposal to map in absorption six Galactic infrared dark filaments.
ALMA interferometer (Chile)	Imaging and spectroscopy with both the 12m and the 7m arrays.
	4 accepted PI proposals (2018 - 2021) with a total of **108 hours**,
	with 1 accepted PI proposal **in full polarization for Zeeman measurements.**
	Co-I of 7 accepted projects since 2013.
JCMT-15m single dish (Hawaii)	Polarization observations with SCUBA2/POL2.
	2 accepted PI proposal (2019) with a total of **60 hours**.
	Co-I of 5 accepted projects since 2019.
	Regional coordinator of the SURFING large program since 2021.
	Active member of the **BISTRO 1, 2, and 3** large programs since 2016.
	2 observing runs of 1 week each (2017, 2018) at the summit of Maunakea, US.
APEX-12m single dish (Chile)	Imaging and spectroscopy with ArTéMiS and SHeFI.
	1 accepted PI proposal (2022) with ArTéMiS of **20 hours**.
	Co-I of 1 accepted proposal with CONCERTO (instrument PI: G. Lagache, LAM)
	Member of the **CAFFEINE** large program with ArTéMiS since 2017.
Nobeyama-45m single dish (Japan)	Molecular line spectroscopy with FOREST/SAM45.
	1 accepted PI proposal (2016) with a total of **78 hours**.
	Co-I of several projects since 2014, including the CIRCUS large program (PI: Y. Shimajiri).
	2 observing runs of 1 week and 3 days each (2017, 2021) at Nobeyama, Japan.
IRAM-30m single dish (Spain)	Molecular line spectroscopy with HERA & EMIR.
	2 accepted PI proposals (2013, 2015) with a total of **108 hours**.
	Co-I of several projects since 2011.
	5 runs of 1 week each (2010 - 2015) at the Pico Veleta, Spain.
Parkes-64m single dish (Australia)	Spectroscopy with the H-OH receiver for Zeeman measurements.
	Co-I of an ongoing project since 2013 with a total of **122 hours**.
Planck Space Telescope	Imaging the Galactic total and polarized cold dust thermal emission with the HFI.
	Member of the Planck collaboration (2013 - 2015).
Herschel Space Observatory	Imaging the Galactic cold dust thermal emission with PACS & SPIRE.
	Member of the HGBS key program (SPIRE SAG3 consortium) since 2009.
	Member of the HOBYS key program (SPIRE SAG3 consortium) since 2009.
Yebes-40m single dish (Spain)	Molecular line spectroscopy.
	2 accepted proposals (2020) with a total of **50 hours**.
	The plan was to use this observing time to train students from the University of Lisbon
	in collaboration with João L. Yun (canceled due to the Covid-19 pandemic).
NTT-3.58m telescope (Chile)	JHK photometry of ultra-cool brown dwarfs and high redshift quasars with SOFI.
	3 runs of 1 week each (2008 - 2010) in La Silla, Chile.
	Observations as part of the Canada-France Brown Dwarfs Survey-InfraRed.

Teaching and Outreach Activities

Lectures

Apr 2021	Lecture on the "Structure of the ISM and star formation" as part of the IAU-OAD AstroSprint project.
Dec 2019	Lecture in the school of the Porto prison.
	Subject: *Introduction to research in astrophysics*
Jul 2017	Lecture in *Takamatsu Sakurai High School* (Kagawa-Ken, Japan).
	Subject: *Research in Astrophysics: Why do I like science?*

Organizing Outreach Activites

May 2021	A series of public talks entitled Noojoom (stars in Arabic) broadcasted live on Youtube (video)
	The event allowed us to collect funds to provide science books to school children in Beirut/Lebanon
Nov 2018	The outreach movie "Observations and Simulations" shot during the international filament conference,
	Nagoya University, Japan. Trailer of the movie: link
2004 - 2007	"Le Club Astro": Founding/leading member of the student club

Invited to Participate in Outreach Activities

Jun 2021	Celebrating women's day (March 8, 2021): A talk with the Lebanese women in astronomy
Jun 2020	Celebrating 20 years of Portugal in ESO (video)
Dec 2019	Participating in the "Libertos" outreach activity in a prison in Porto.
Feb 2014	Prison activities at *la maison d'arrêt de Bois d'Arcy* with "Champ Libre" (a non-profit organization).
	Subject: *Light as a messenger of extraterrestrial knowledge*

Student and Postdoc Supervision

2024 –	Supervising (100%) K. Mallick a new **postdoc** from India who will join NAOJ from March 2014.
2023 –	Co-supervising (40%) the theoretical **PhD** project of H. Fukihara (Supervisor: Yusuke Tsukamoto, Kagoshima Univ.).
2023	Supervising (100%) the internship of the **undergraduate student**, Yunn Ting Tan, from Singapore (2 months).
2022 –	Co-supervising (50%) the theoretical projects of **postdoc** Y. Misugi (Supervisor: Iwasaki Kazunari, NAOJ), **Japan**.
2021 –	Co-supervising (20%) the theoretical **PhD** project of R. Kashiwagi (Supervisor: Iwasaki Kazunari, NAOJ), **Japan**.
2021	Supervising (100%) the **Master's** project of H. Haddad at Univesité Aix-Marseille, **France** (3 months). Master's thesis project: "Star formation from filament fragmentation".
2017 – 2022	Co-supervising (40%) the **Master's and PhD** theoretical projects of Y. Misugi at Nagoya University, **Japan**. Main supervisor: Shu-ichiro Inutsuka. Y. Misugi defended his PhD on February 8, 2022.

International Research Fellowships

2021	Awarded a NAOJ fellowship, Japan
2016	Awarded a JSPS fellowship, Japan

Awarded competitive fundings

Research grants

2023	NAOJ Visiting Joint Research Grant to invite Lars Bonne (NASA) to NAOJ for one month (390,000 JPY).
2016 – 2018	Young researcher JSPS research grant, Japan (2,000,000 JPY).

Educational grants

2023	SOKENDAI Support for Establishment of International Joint Degree Programs, with Cardiff University (623,000 JPY) and Aix-Marseille University (567,000 JPY).

Internatinal conference organization fundings

2023	Inoue Zaidan funds for conference organization (700,000 JPY).
2023	NAOJ, Division of Science funds for conference organization (700,000 JPY).
2018	Conference organization funding from NAOJ, Japan (1,000,000 JPY).
2018	Conference organization funding from Nagoya University, Japan (1,000,000 JPY).

Outreach

2018	Outreach funding from "SECOM Science and Technology Foundation", Japan (1,000,000 JPY).

Student research grants

2009 – 2012	PhD grant from the French CNRS
2009	Research project mobility fund from the Paris VI University for the Master's (II) thesis project conducted at the University of St Andrews, Scotland
2008	Research project mobility fund from the Paris VI University for the Master's (I) thesis project conducted at the University of Massachusetts, USA

Seminars

Japan	NAOJ (October 2021), Osaka University (July 2018), NAOJ (June 2018), Tokyo University (November 2017) Nagoya University (March 2017), Nobeyama Observatory (March 2017), Konan University (November 2022) Tokyo Komaba University (May 2023)
USA	East Asian Observatory, Hilo, Hawaii (May 2017)
Canada	DRAO/Penticton and DAO/Victoria (November 2019)
Europe	Max Planck Institute, Garching, Germany (June 2023) – Cardiff University, UK (June 2023) Observatoire de Paris, France (February 2022) ENS Paris, France (April 2018) – CAUP, Porto, Portugal (January 2020) Radboud University, The Netherlands (May 2015) – IRAP, Toulouse, France (March 2014) Observatoire de Bordeaux, France (May 2012)

Invited Talks in Conferences (9)

April 2023	Protostars and Planets VII, Kyoto, Japan (**International**)
July 2021	Cosmic Star Formation, Bath, UK (**International**) Invited to give a review talk on "Local Star Formation"
July 2021	Puzzles of Star Formation, Ringberg Castle, Germany (**International**)
May 2018	Cloud-cloud Collision and Star Formation, Nagoya University, Japan (National)
December 2017	Role of Magnetic Fields in Star Formation, Kagoshima University, Japan (National)
November 2017	Science with SPICA, ISIS/JAXA, Japan (National)
August 2017	NRO45m/ASTE Single Dish Science Workshop, Nobeyama, Japan (National)
July 2016	Star Formation in Different Environments, Quy Nhon, Vietnam (**International**)
August 2015	XXIX IAU General Assembly, Honolulu, Hawaii, IAU symposium 315 (**International**)

Contributed Talks in Conferences (19)

March 2023	"On the Sun Birth environment", Spring ASJ annual meeting, Tokyo, Japan
December 2022	"The role of hub-filament systems in the formation of low- to high-mass stars", Miyakojima, Japan
March 2021	"The complex B-field structure of the NGC 6334 hub-filament system", Hiroshima (virtual)
June 2019	"Filament and sheet-like-cloud interaction", Zooming in on Star Formation, Nafplio, Greece
March 2018	"Understanding the properties of interstellar filaments", Spring ASJ annual meeting, Chiba, Japan
September 2017	"Observed properties of interstellar filaments", Autumn annual meeting, Hokkaido, Japan
July 2017	"Observed properties of interstellar filaments in nearby clouds", APRIM 2017, Taipei, Taiwan
June 2016	"EPoS: The Early Phase of Star Formation", Ringberg Castle, Germany
April 2015	"Signature of the magnetic field geometry derived from Planck observations", Magnetic field workshop, Toulouse, France
March 2015	"Signature of the magnetic field geometry derived from Planck observations", Filament workshop, Munich, Germany
December 2014	"Planck 2014: The microwave sky in temperature and polarization", Ferrara, Italy
November 2014	"Dust polarization observations towards interstellar filaments as seen by Planck", Star Formation across Space & Time, ESTEC, The Netherland
September 2014	"Polarization observations towards interstellar filaments as seen by Planck", GESF, Marseille, France
May 2014	"Modeling the 3D magnetic field structure inspired by Planck", OSSF14, Katerini, Greece
October 2013	"Modeling 3D magnetic field structures inspired by Planck", Physical processes in the ISM, Garching, Germany
June 2013	"Properties of filaments observed with Herschel", SF2A, Montpellier, France
June 2012	"Characterizing the properties of interstellar filaments with Herschel", The Labyrinth of Star Formation, Chania, Greece
March 2012	"Characterizing the properties of interstellar filaments with Herschel", From atomes to Pebbles, Grenoble, France
September 2011	"Characterizing the properties of interstellar filaments with Herschel", The Milky Way In The *Herschel* Era, Rome, Italy

Poster Presentations in Conferences (7)

June 2023	"On the Sun Birth environment", Star@Lyon international conference, France
April 2023	"On the Sun Birth environment", PPVII, Kyoto, Japan
July 2017	"Observed properties of a filament system in Orion B", Francesco's Legacy, Florence, Italy
July 2014	"Planck intermediate results XXXIII: Signature of the magnetic field in dust polarization maps", PCMI, Rennes, France
October 2013	"Properties of interstellar filaments as revealed by the Herschel Gould Belt survey", ESLAB, ESTEC, The Netherland
July 2010	"Analysing the properties of filaments observed with Herschel in IC5146", Constellation meeting, Tenerife, Spain
June 2010	"Filamentary structures in molecular clouds as seen by Herschel", Computational star formation, Barcelona, Spain

Languages

Armenian & Arabic	Native
French & English	Fluent
Japanese	Intermediate level
Spanish & Portuguese	Basic knowledge
Music	Solfège, reading, and writing

Press Releases

– NAOJ press release, June 22, 2023 Japan (link).
– AAS Nova, a feature of the AAS journals, May 2023, USA (link).
– The Astronomical Herald, October 2022 Japan (link).
– AGBU Insider, May 2020, New York – Women in Stem – Featuring Doris Arzoumanian (link).
– Astronomy Picture of the Day, August 19, 2011 (link).
– "Herschel unravels the thread of star formation in the Gould Belt", ESA Science & Technology, April 2011 ((link).
– General public astronomy magazines (France): Science & Vie (July 2011), Ciel et Espace (October 2011)