Curriculum Vitae
Pia Astone
Dirigente di Ricerca, INFN, Sezione di Roma
LIGO/Virgo/KAGRA and ET collaborations, for the search of gravitational waves

CURRICULUM VITAE

Personal Information:

Astone
Pia
ORCID: 0000-0003-4981-4120

Education:

1984: Master degree in Physics, " Laurea Vecchio ordinamento" , Score: 110/110 cum laude
Physics Department of the Rome University La Sapienza

Current Position(s):

From 01/01/2021: Dirigente di Ricerca (First level) INFN, Rome division
Academic year 2022-2024: Contract Professor, Engineering DIAG Department, Sapienza University of Rome

Previous Positions:

Fall 1984-May 1986: teaching experiences in secondary italian schools, at the military school for aereonautics in Pratica di Mare. Volunteer assistant at the Engineering Dept. of La Sapienza University.

June 1986-30/11/1988: Radar project designer, Contraves (Rome).

01/12/1988-30/11/1990: INFN non-permanent researcher position
01/12/1990-28/02/2000: INFN researcher position (third level)
01/03/2000-31/12/2020 INFN first researcher position (second level)

Academic year 2021-2022: Contract Professor, Facoltà di Scienze Matematiche Fisiche Naturali of La Sapienza University

Fellowships and awards:

GW=Gravitational Waves.
15/05/2016: Special Breakthrough Prize for the direct GW detection;
12/07/2016: Gruber Cosmology Prize for the first GW detection, http://gruber.yale.edu/ligo-team-members.
07/06/2017: Einstein Medal.
11/12/2017: Physics World 2017 Breakthrough of the Year Award for the direct GW detection

ASN habilitation for Full Professor, first level, scientific disciplinary sector FIS02 / C1 (Astronomy and Astrophysics), validity: 16/05/2019-16 / 05/2030
ASN habilitation for Full Professor, first level, scientific disciplinary sector FIS02 / A1 (Physics of Fundamental Interactions), validity: 20/12/2019-20 / 12/2030

SUPERVISION OF GRADUATE STUDENTS; PhD POSTDOC STUDENTS:

2022-2025: Supervisor/Co-Supervisor of four PhD in Physics, Sapienza Univ. of Rome (joint with Ariel, Israel, Sandhya S. Menon), Cagliari University (Lorenzo Mirasola), Napoli Federico II (Martina Di Cesare), National Institute for Space Research, Brazil (Julio C. Martins, only external supervision for an abroad experience). Sapienza University (Lorenzo Silvestri).
Martina Di Cesare is going to discuss the PhD in 2026. Julio C. Martins is now back to Brazil and will discuss the thesis in the upcoming months.

2016-2019: Supervisor of one PhD in Physics, Sapienza Univ. of Rome (joint with Florida University, US, Andrew Miller)
2023-2025: 1 Post-doc, INFN Rome (PNRR ICSCS)
2023-2025: 1 Post-doc, INFN Rome (PRIN2020BRP57Z)
2023-2025: 2 Post-docs, Sapienza Rome (PRIN2020BRP57Z.)
2021-2023: 1 Post-Doc, INFN Rome (Fellini)
2022-2023: 1 Post-Doc, Sapienza, Rome (Amaldi Research Center)
2020-2021: 1 Post-Doc, Sapienza, Rome (Amaldi Research Center

TEACHING ACTIVITIES:

2011-2022: Tutor of 9 students, Summer students program IREU, Florida,

2020-2021, 2021-2022. PhD in Physics, Sapienza, Rome. Advanced data analysis techniques.

2022-2023, 2023-2024, 2024-2025. Engineering DIAG Department, Sapienza. Rome. Physics

2021-2022: Facoltà di Scienze Matematiche Fisiche Naturali SMFN, Sapienza Rome, Physics 2

2005 - 2022: Faculty of Pharmacy, Sapienza. Rome. Physics

Tutor in several laboratory physics experiences in the last ~ 10 years, for both Physics and

Astronomy Astrophysics.

Nel 2022 ho contribuito all' adattamento dei testi del volume SBN: 9788836230730 , per una edizione italiana con contenuti rielaborati per il livello di corsi di Fisica delle nostre Università, in particolare al di fuori della facoltà di scienze. Titolo: Fondamenti di Fisica . Autori: Serway - Jewett . Editore: Edises (adattamento a cura di R. Bellotti, V. Cataudella,…P. Astone, et al.)

ORGANISATION OF SCIENTIFIC MEETINGS:

LOC:Local Organizing Comm.; SOC: Scientific International Comm.

2024: LOC and SOC of the second GEMMA conference on GW, Multimessenger Astronomy, Dark Matter, Rome, Physics Dept. Sapienza, Italy.

2023: LOC "The rise of Particle Physics",IOP, Rome Italy (2024)
2022: LOC Pharos conference Rome, Italy
2019: LOC of the "First European Physicist Society Conference on Gravitation", Rome.
2018: SOC, GEMMA conference on GW, Multimessenger Astronomy, Dark Matter, Lecce, Italy.
2016: SOC and LOC, 5th GraWIToN School, Rome, Italy
2010: LOC of the GWDAW-14, Rome

INSTITUTIONAL RESPONSIBILITIES:

June 2022-June 2025: National PI of the PRIN 2020BRP57Z. International activity,
Sept 2022-March 2026: Local coord. of the ICSCS Spoke 2 PNRR.
From 2020 and until December 31, 2024: Chair of the Virgo Rome group and member of the Virgo Steering Committee (VSC)
2018-2022: Member of Steering commitee of the Amaldi Research Center, Sapienza. Rome
2019-2023: National coordinator of the INFN Lab2go projects, for Physics lab activities in secondary schools, Italy
2012-2014: Scientific co-coordinator of the LIGO/Virgo collaboration,member of the VSC. Activity to prepare the science that resulted in the GW discovery.

2012-2014: Computing coordinator, Advanced Virgo Project. International.
2013: LIGO /Virgo task force for the renewal of the agreement
2010-2012: Co-chair of the Continuous Wave (CW) LIGO/Virgo group. International.
2012-2015: chair of the ROG Rome group. Rome, Italy.
1998-2003: co-chair of the “International Gravitational Event Collaboration”

REVIEWING ACTIVITIES:

2024: Reviewer of ERC Advanced grant proposals

2023:Reviewer of the "Scientific Research Funding Call: Small and Medium-Size Research Projects” of Sapienza, Rome.
2023: Reviewer of the "Science, Tecnology Facilities Country (STFC) Technology and Skills Call 2023”, for the The Indian Department for Atomic Energy (DAE) and the STFC council
2022: Reviever for Poland grant proposals, National Science Center, NCN Panel Stp. Polonia
2022: Commssion to assign a 3 years researcher position (RTDA) in Astronomy and Astrophysics in SISSA, Trieste
2022: Commisison to assign a technological 3-year position, for the ERC DARK project, Sapienza, Rome
2020: Reviewer of STFC proposals, STFC2020 GW, UK
2020: Reviever for Poland grant proposals, National Science Center, NCN Panel Stp. (Preludium-19, ST9: Astronomy and Space Science) Polonia
2018- member of the INFN commission for the recruitment of 3 permanent researchers, III level (research theme: experimental GW searches), call 20010/18.

2012-2013: review of some ANVUR proposals
Since ~ 1998: Reviewer of many journals (PRD, CQG, PRL..)

MEMBERSHIPS OF SCIENTIFIC SOCIETIES:

--From Aug. 2024: Elected member of the IAU Commission D1 (Gravitational Wave Astrophysics), https://www.iau.org/science/scientific_bodies/commissions/D1/

-International Astronomical Union (IAU) permanent member

-Italian Society of General Relativity and Gravitation (SIGRAV) permanent

-Italian Society of Physics (SIF) Renowed yearly.

MAJOR COLLABORATIONS:

From 2022: member of the Einstein Telescope (ET) collaboration. International. GW searches
From 2007: member of the LIGO/Virgo collaboration, now the LIGO/Virgo/KAGRA collaboration. GW searches, with present responsibilities within the CW group.
From 2003: member of the Virgo collaboration. GW searches. 2012-2014: Activity to prepare the science that resulted in the GW discovery.

TRACK RECORDS

Track Record:

Author of mora than 400 papers in international refereed journals. Index H (Scopus,2023): 90
RESEARCH FIELDS
• Physics of GWs; GW Data Analysis, with expertise in stochastic background research and transient signals (at the beginning) and in the research of continuous and long transient gravitational waves (CW), in more recent years; Observational relativity and cosmology. Noise hunting. Computational issues. My main interest and goal is the detection of signals from neutron stars (NS), both of known parameters (such as the pulsar of the Vela and Crab) and unknown ("All-Sky searches" aimed at the whole sky, the whole frequency band [10-2048] Hz and a wide spin-down range).
• Outreach activities, for dissemination of results related to GW searches and activities for physics laboratories in secondary Italian schools.

INVITED TALKS to Conferences, PhD schools:
In addition to numerous specific contributions to scientific conferences and seminars (as well as collaboration meetings) I have been invited as a speaker in the plenary sessions of numerous international scientific conferences. Among others, already in 2001 I was invited to Perth for the "4th E. Amaldi Conference" to summarize the results and status of the resonant GW detectors. Coming to the last years, in 2015 I was invited to the Marcel Grossman meeting, to talk about the state of CW signal searches, in LIGO / Virgo. I have been invited twice, by the organizers of the Spanish General Relativity Meeting (ERE). The last time was in September 2015 (immediately before GW's discovery). In December 2017 I was invited to present the recent discoveries of LIGO / Virgo at the workshop of the Italian Space Agency (ASI). From January to March 2018, I was invited to 3 other international conferences, on different topics, all related to my research activity on GW. In May 2018 I was invited to the workshop "Light, Imaging, Microscopy, Spectra" (LIMS), http://www.frascati.enea.it/LIMS2018/, on the role of optical technologies in the discovery of GW.

LIST of 11 recent INVITED TALKS to international conferences/schools:

MAY 2024: GWPAW 2024, Invited talk: The Search of Gravitational Waves with Ground based detectors: recent results and discovery frontiers. Birmingham University.
OCT 2023: GRASP2023, "Recent results and future challenges for isolated continuous gravitational wave searches with a network of terrestrial gravitational wave detectors" Pisa.IT
JUL 2022: Bulgarian Space School "The search for GW..". Theory and practical sessions. For PhD students. Invited under the suggestion of the Nobel Laureate, Prof. B. Barish. Bulgary.
JUN 2022: 12 Iberian GW meeting " Recent results and future challenges for the search of CWs with the LIGO and Virtgo detectors", Portougal.
JAN 2020: TMEX2020: : “The search of gravitational waves with ground-based detectors" Vietnam
JUN 2019 INAF, Science Archives and Big Data challenge. "``Challenges in data management and distribution within the terrestrial network of gravitational wave detectors ", Rome.IT
MAR 2018, Actual Problem in theoretical Physics "Present results and future challenges with the network of gravitational wave detectors", Vietri Sul Mare, IT
MAR 2018, GRASS: Gravitational Waves Science and Technology Symposium "Recent results and future challenges for Continuous waves and Stochastic background searches with a network of gravitational wave detectors" Padova, IT
FEB 2018, Clues on GRB origin from chemical evolution models. "Observation of gravitational waves from a binary neutron star merger with LIGO and Virgo detectors", Sexten, IT
DEC 2017, ASI (Italian space Agency) GW workshop. "Observation of gravitational waves from a binary neutron star inspiral with the LIGO and Virgo detectors", Rome.IT
SEP 2015, Spanish Relativity Meeting, ERE2015 "GW searches with the LIGO and Virgo detectors: recent results and perspectives for the upcoming Advanced Detectors Era”, Palma De Majorca, Spa

My main scientific interest within the LIGO/Virgo/KAGRA (LVK) collaboration is the science of neutron stars (NS) and data analysis (DA) for the detection of continuous gravitational waves (CW) from rapidly rotating neutron stars (NS). CW signals have not yet been detected, but important efforts come both from the experimental side and from the use of more sophisticated and robust data analysis tools, and this is my field of expertise. More recently, my interest started to cover also the detection of signals due to long-transient GW emission, like those produced by the birth of a rapidly rotating magnetar following a supernova explosion. or the merger of two NSs. Some of these aspects, the work done to design solid procedures, and some recent results obtained with my specific and strong involvement, are documented in the papers I am going to list here.
Within the LVK I am also internal reviewer of analysis pipelines and/or search results.

SELECTED LIST OF 12 PAPERS (ordered for topic covered) PRD=Physical Review D; APJ: The Astrophysical Journal. PRL: Physical Review Letters

PRL 35 (11), art. no. 111403. (2025) GW250114: Testing Hawking's Area Law and the Kerr Nature of Black Holes
PRD 96, 062002 (2017) All-Sky searches, O1
PRD 100, 024004 (2019) O2 All-Sky searches
PRD 106, 102008 (2022) O3 All-Sky searches

PRD 98, 102004 (2018) GFH method for Long transient searches
APJ 875, 2, (2019) Post merger search
PRD 100, 062005 (2019) Machine learning method for long transient's searches
PRD 98, 122002 (2018) ML for transients

PRD 106, 042009 (2022) Dense CW signals and their impacts in the analysis

PRL 116, 061102) (2016) GW150914 (The first discovered GW signal)

PRD 110.082004 (2024) Method to search for inspiraling planetary-mass ultracompact binaries using the generalized frequency-Hough transform

PRD 110.103047 (2024) Neural network method to search for long transient gravitational waves

Description of main scientific results:

Regarding All-Sky searches and Long-Transient searches for CWs (Continuous GW searches):

PRD 96, 062002 (2017), PRD 100, 024004 (2019), PRD 106, 102008 (2022). The FH method, of which I am responsible, is a search methos (see PRD 90,042002,2014), used in several LVK searches for unknown neutron stars emitting continuous signals. Improvements to the method have been done during these years and are described in 3 cited papers.
FH method has been successfully used also in other CW searches and for follow up of candidates.
I worked also, giving a major contribution, on the analysis for the search for a signal following the merger of the two neutron stars, which produced, in August 2017, the **GW170817 signal**. Here we have applied a procedure that is the result of a modification of those applied to search for continuous signals (Generalized Frequency Hough, GFH), based on the idea of Andrew Miller, my PhD student at that time. We have also done some comparison studies to carry on the search with Machine Learning (ML), using Convolutional Neural Network (CNN).
GFH method is described here: **PRD 98, 102004 (2018).** It has been used to search for a possible long transient following the coalescence GW170817. The result has been published with an LVK papers, in **APJ 875, 2, (2019).** A preliminary study of the application of CNN tools has been published in **PRD 100, 062005 (2019).**
I have also contributed to a methodological article to identify a procedure for detecting short transients from supernova explosions, **PRD 98, 122002 (2018).**
The impact of signal clusters in wide-band searches for CW searches, very relevant for future detectors like ET and also for some cases of ultra-light dark matter (DM) searches has been, mainly by me and my student L. Pierini, in **PRD 106, 042009 (2022).**

I am presently responsible **for All-sky searches** on isolated Neutron Stars on LIGO data **of the latest scientific run O4a**, that will be published at the beginning of the year 2026 (the search is very long as computationally bounded, and consists of several analysis steps. Our part has now been completed and the paper is ready for internal LVK circulation) and on a search around the time of the recent SN explosion**, SN2023ixf,** happened in May 2023 during a LIGO engineering run, in which we aim at putting an upper bound on the signal emitted during the birth process of the remnant. The source is estimated to be too far to detect the GW signal, but this is a good exercise to design and run a new optimized procedure, based on a generalization of the more classical Frequency-Hough procedure. The **method paper** is now on Archive and has been sent to PRD: https://arxiv.org/pdf/2512.09878
The search is ongoing, even if we know the detectors sensitivity was not such to be able to detect a signal.
I am also responsible for creating a particular data base of the LIGO/Virgo/KAGRA data, needed for many analysis (**the FFT data base**, named the SFDB) These data, when the proprietary data period ends, are available for usage by external groups).

I have been **the scientific co-coordinator of LIGO/Virgo in the years 2012-2014**, where we were preparing the advanced detectors era science, and thus my contribution to the first GW discovery was relevant and I was one of the 6 scientists (only 2 of Virgo) in charge **of writing the discovery paper on GW150914** (PRL 116, 061102) (2016). See the article in LIGO magazine:

Outreach:

I am also actively involved in outreach activities. During the last year,2024, I have participated as invited speaker to the Genova, Bergamo and Fermo festivals. In Genova I have also contributed to the laboratory on Gravitational Waves, organized with my Rome Virgo group. I have participated also to several outreach activities organized by the EGO (European Gravitational Observatory) and Virgo groups in Cascina. Among these, I have recently (Nov. 4th 2025) been invited to celebrate the 10 years of the GW discovery: https://www.ego-gw.it/blog/2025/10/28/the-craziest-of-endeavors-virgo-from-the-80s-to-today/

I have also given seminars in schools, at different levels, and am presently in the organizing committee and tutor of the Lab2go PCTO project (which is an INFN and Sapienza project for secondary Italian schools, aimed at promoting the laboratory practice in schools).

For this, see the paper in the proceedings of the 2022 INTED conference (16th International Technology, Education and Development Conference), by Giulia De Bonis and myself: “Lab2go: a project for supporting laboratory practice in teaching stem disciplines in high school”.

I am also one of the Pint of Science Rome organizers, team Roma-Frascati: https://pintofscience.it/team/Team%20Roma-Frascati.

The podcast “Virgo l’Universo si fa suono” https://www.raiplaysound.it/programmi/virgoluniversosifasuono

contains several contributions from me (RayPlay, together with the EGO, European Gravitational Observatory support).

The paper A. Bile,..P. Astone et al, “Gravitational music: a mathematical-musical model for the popularization of gravitational waves”

in Physics education (2024) is another example of my outreach and teaching activities.

My personal web pages contain some references mainly for outreach activities. There are also pages that can be useful to see the material produced during academic activites (https://www.roma1.infn.it/~astone/didattica/)

Pia Astone

31/Dic 2025