

Alberto Iess

Curriculum Vitae

Research Overview

My main research interest is gravitational wave data analysis, with specific focus towards the development and deployment of innovative machine learning pipelines for transient signal detection and classification, multi-messenger astrophysics and detector characterization. Related research interests include parameter estimation, signal processing, data infrastructure and computing. I take part in the Open Science Clusters' Action for Research and Society (OSCARS), acting as the Technical Coordinator of the ESCAPE collaboration, which focuses on fostering the uptake of Open and FAIR Science practices in the astronomy, astro-particle and particle physics communities. I have been a member of the Virgo collaboration and participated in Cost Action CA17137 and in EU H2020 EOSC-Future project. Currently I am a member of the Einstein Telescope collaboration, for which I co-develop the multi-messenger astronomy project Wavefier, one of the "Extreme Universe" technical science projects of EOSC-Future. As a member of the Virgo collaboration and of CA17137, during my PhD and postdoc in Scuola Normale Superiore I contributed to the Ligo and Virgo machine learning, burst and detector characterization groups, developing convolutional and recurrent neural network classifiers for core-collapse supernovae, binary merger signals and detector noise transients. I have also taken part in a test case project for working package 3 - Open-source scientific Software and Service Repository (OSSR) of ESCAPE (European Science Cluster of Astronomy and Particle physics ESFRI research infrastructures), in synergy with Orobix, to deploy the use of data version control software (*hangar*) in a Virgo R&D pipeline developed within my research group, based on machine learning. I am developer and maintainer of the Wavelet Detection Filter (WDF) pipeline for gravitational wave burst searches. I have lead or been involved in multiple projects for the design and implementation of real-time gravitational wave analysis and multi-messenger pipelines, signal reconstruction and source parameter estimation.

Work Experience

- Nov 2024 - present - **Technical Coordinator for the ESCAPE Scientific Collaboration, CDD Researcher**, CNRS - *Laboratoire d'Annecy de Physique des Particules*, Annecy-Le-Vieux.
Funded by Open Science Clusters' Action for Research and Society (OSCARS) under Horizon Europe Research and Innovation programme, grant agreement No. 101129751
- Oct 2023 - **Project-based contract**, *Compla S.r.l.*, Pisa.
Jan 2024 Scientific and technological coordination for multi-messenger project *Wavefier*.
- Oct 2021 - **Postdoctoral Researcher**, *Scuola Normale Superiore*, Pisa.
Sep 2023 Machine Learning and Multi-messenger analysis for gravitational wave data within European Open Science Cloud environment.

Education

Degrees

- Nov 2017 - **PhD Degree in Astronomy, Astrophysics and Space Science**, *Università Degli Studi di Roma Tor Vergata*, Roma, cycle XXXIII.
April 2021
Title: *Deep Learning For Core-Collapse Supernova Gravitational Wave Signals And Noise Transients*. Supervisors: *Prof. Viviana Fafone, Dr. Elena Cuoco*
- Apr 2014 - **Master's Degree in Physics**, *Università Degli Studi di Roma Tor Vergata*, Roma,
May 2017 *110/110 cum laude*.
Title: *Candidate Verification Tests For All-Sky Continuous Gravitational Wave Searches*. Supervisors: *Prof. Viviana Fafone, Dr. Sabrina D'Antonio*
- Oct 2010 - **Bachelor's Degree in Physics**, *Università Degli Studi di Roma Tor Vergata*, Roma,
Mar 2014 *107/110*.
Title: *Cosmology From Space: A Comparison Between The Planck And WMAP Missions*. Supervisor: *Prof. Nicola Vittorio*

Visiting And Exchange Periods

- 20 Oct 2025 - **International Guest**, *Università di Bologna, Department of Physics and Astronomy*
4 Nov 2025 "*Augusto Righi*", Bologna.
Topic: collaboration for ET virtual research environment and multi-messenger Wavefier Project. Supervisor: *Dr. Elena Cuoco*
- Oct 2018 - **Visiting Graduate Student**, *Scuola Normale Superiore*, Pisa, Approx. 2 months
Dec 2020 total.
Topic: collaboration for machine learning projects to be developed in Advanced Virgo. Supervisor: *Dr. Elena Cuoco*
- Jul 2015 - **Visiting Graduate Researcher**, *University of California Los Angeles*, Los Angeles,
Sep 2015 July 27 to September 4.
Topic: ion-cyclotron waves and mirror modes in Saturn's E-Ring. Supervisor: *Dr. Krishan Khurana*
- Apr 2014- **Erasmus Exchange Period**, *Ruprecht-Karls Universitaet*, Heidelberg, April through
Sep 2014 September.

Conferences, Schools And Workshops

Contributions

- 2023 Contributed talks at *Ligo-Virgo-Kagra Collaboration Meetings* (online)
- 2023 Contributed talk at *Use cases from the EOSC community* (online demo workshop)
- 2022 Contributed talk at *Supernovae in the Gravitational Wave Detection Era*, Swinburne University of Technology, Melbourne
- 2022 Presentation of the Multi-Messenger "Extreme Universe" Test Science Project *Wavefier* at "*ESCAPE to the Future*" Final Event, Royal Belgium Institute of Natural Sciences, Bruxelles
- 2022 Member of the Scientific and Local Organizing Committee for the g2net workshop *Machine Learning in GW search: g2net next challenges*, European Gravitational Observatory, Pisa (with contributed talk)
- 2022 Presentation at *EOSC-Future ESCAPE Science Projects progress meeting*, CERN, Geneva

- 2022 Presentation at stakeholder engagement session of the *g2net science and innovation meeting*, University of Glasgow
- 2022 Invited talk at *AI goes MAD* workshop, Institute of Theoretical Physics, Universidad Autónoma de Madrid
- 2022 Contributed talk at *CA17137 g2net Working Group 1 meeting*, Universidad de Valencia
- 2021 Invited talk at the Banff International Research Station for Mathematical Innovation and Discovery (BIRS) *Detection and Analysis of Gravitational Waves in the Era of Multi-Messenger Astronomy: From Mathematical Modeling to Machine Learning* workshop, Casa Matemática Oaxaca
- 2021 Lecturer: "An introduction to gravitational wave data analysis" at the *ESCAPE Summer School: Datascience for Astronomy, Astroparticle and Particle Physics*, recording available at <https://escape2020.github.io/school2021/posts/clase25/>
- 2021 Hands-on session: "Hands-on data-versioning for scientific pipelines with Hangar" at the *ESCAPE Innovative Workflows in Astroparticle And Particle Physics Workshop*, recording available at <https://www.youtube.com/watch?v=IQRK2EViMxA>
- 2021 Contributed talk at *Ligo-Virgo-Kagra Collaboration Meeting* (online)
- 2020 Tutor at the *2nd g2net Training School CA17137*, University of Malta Valletta Campus, La Valletta
- 2020 Poster: "Hangar at VIRGO" at *XXX Astronomical Data Analysis Software and Systems (ADASS) conference* (co-presented)
- 2019 Poster: "Machine-Learning Classification Of Core-Collapse Supernovae And Detector Glitches" at the *22nd International Conference on General Relativity and Gravitation, 13th Edoardo Amaldi Conference on Gravitational Waves*, Valencia
- 2019 Contributed talk at *10th Young Researchers Meeting*, Università degli Studi di Roma Tor Vergata
- 2019 Contributed talk at *1st Conference on Machine Learning for Gravitational Waves, Geophysics, Robotics, Control Systems*, European Gravitational Observatory, Pisa
- 2018 Member of the Scientific and Local Organizing Committee for the *2018 Workshop of the Astronomy, Astrophysics and Space Sciences PhD program*, Università degli Studi di Roma Tor Vergata (with contributed talk)

Affiliations And Memberships

- 2018–present Member of the Virgo Collaboration.
- 2022–2023 Member of the INFN Pisa Research Unit for the Einstein Telescope Collaboration, member of Einstein Telescope Observational Science Board, Div. 10 (*Data Analysis Platform*)
- 2018–2023 INFN Roma Tor Vergata (2018-2021), INFN Pisa (2021-2023) affiliate
- 2019–2022 Member of Cost Action CA17137 "g2net": *A network for Gravitational Waves, Geophysics and Machine Learning*.

List Of Publications

100+ publications in peer-reviewed journals (<https://www.scopus.com/authid/detail.uri?authorId=57204156321>).
h-index: 49 (Scopus)

Computer Skills

Basic IDL, C++, FORTRAN, HTML, CSS, JAVASCRIPT, Kafka, Singularity, Zenodo, Grafana, HPC, Qiskit
, Intermediate UNIX bash, PYTHON (overall), L^AT_EX, OpenOffice, Git, Docker
Advanced PYTHON (scientific, machine learning libraries), Jupyter

Reviewing Activity, Grants, Scholarships and Other

- Reviewer for Nature Computational Science, MNRAS, Physical Review D, Physics Letters B, MDPI *Universe*.
- Coursera Certificates for: DeepLearning.AI course *Introduction to TensorFlow for Artificial Intelligence, Machine Learning, and Deep Learning.*, IBM course *Introduction to Cloud Computing.*, IBM course *Introduction to Web Development with HTML, CSS, JavaScript.*, IBM course *Getting Started with Git and GitHub*.
- Successful proposal for the CINECA Italian SuperComputing Resource Allocation (ISCRA) project IsC80_DeepSBKG: "Deep Learning for Gravitational Wave Stochastic Background Detection".
- Awarded 1500 EUR Cost Action CA17137 Virtual Mobility Grant (E-COST-GRANT-CA17137-12c5ab27) in September 2021.
- Awarded 1500 EUR mobility grant as an International Guest at the Department of Physics and Astronomy "Augusto Righi" at Università di Bologna.
- Owner and maintainer for Wavelet Detection Filter project (<https://wdfpipe.gitlab.io>), Wavefier project (<https://github.com/wavefier>).
- Member of: OSCARS, EOSC-Future EU H2020, CA17137, INFN.
- Multiple Virgo detector characterization shifts at the European Gravitational Observatory in Cascina.
- Erasmus scholarship at the University of Heidelberg, Germany (5 months).
- Bachelor's Degree scholarship (3000 EUR total) for top scores in admission tests at the Università Degli Studi di Roma Tor Vergata.
- Winner of the literary prize "Come un granello di sabbia" in the category "Aforismi". The prize granted free publication of the poetry book: *Versi dall'Orizzonte, PensieriParole* (2010).
- National Winner of the XIII° Olimpiad of Logical, Linguistic and Mathematical Games "Gioia Mathesis" (2003).