María Gabriela Navarro

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RESEARCH INTERESTS

- Galaxy: formation, structure, and evolution of the Milky Way
- Transients: RR Lyrae population and gravitational microlensing
- JWST observations of young stellar objects
- Spectral diagnostics of jets/outflows from young stars

POSITION

- **INAF – Osservatorio Astronomico di Roma (OAR)** Rome, Italy
  Post-doctoral Researcher ("Assegno di Ricerca") *04/2022 - present*
  Visiting research: research period in Dublin as training in the processing of MIRI/JWST data, April 2022 and April 2023
  Dublin Institute for Advanced Studies (DIAS) & Maynooth University (Ireland).

EDUCATION

- **Università di Roma "La Sapienza" & Universidad Andrés Bello (UNAB)** Rome, Italy & Santiago, Chile
  Ph.D. in Astronomy, Astrophysics and Space Science - Summa Cum Laude (with honors) *2017 - 2021*
  Thesis title: Microlensing events and old stellar populations around the Galactic center.
  Advisors: Prof. Dante Minniti & Prof. Roberto Capuzzo-Dolcetta.

- **Pontificia Universidad Católica de Chile (PUC)** Santiago,Chile
  Bachelor's degree in Astronomy and Astrophysics - Summa Cum Laude (with honors) *2011 - 2016*
  Thesis title: RR Lyrae population and microlensing events in the Galactic bulge.
  Advisors: Prof. Manuela Zoccali & Prof. Dante Minniti.

REFEREED PUBLICATIONS

Total of 20 refereed publications with two in revision (Navarro et al., 2025 and van Dishoeck et al., 2025).
(ADS library/Refereed Publications)
Total of 13 nonrefereed publications including conference proceedings, presentations, etc.
(ADS library/Non-refereed Publications).
H-Index: 16. 19 top-cited records with 212 total citations.
See the attachment with the complete list of publications.

STUDENTSHIPS/GRANTS

- **Mini grant**: (2024-2025) INAF, Observatory of Rome, Italy for ∼20k USD.
- **Vitamina G**: (2021-2022) Regione Lazio, Italy for ∼25k USD.
- **National Ph.D. Scholarship**: (2017 - 2020) Conicyt, Chilean Government, Chile for 57,4k USD.
- **Scholarship for the development of Ph.D. thesis**: (2020 - 2021) Conicyt, Chilean Government, Chile for 5k USD.
- **Financial support for Co-tutela Ph.D. thesis**: (2018 - 2020) Conicyt, Chilean Government, Chile for 25,2k USD.
- **Scholarship for the Vatican Observatory School**: (2018) Vatican Observatory, Italy for ∼ 3k USD.

PARTICIPATION IN RESEARCH PROJECTS AND SCIENTIFIC WORKING GROUPS

- **Coordinator**: of work package 1 "Mass accretion on young stellar objects (YSOs)" of the The VVV eXtended Spectroscopic Survey (VVVXSS). The ESO/KMOS public large spectroscopic galactic survey.
- **Member**: of the Italian JWST Support Center as MIRI expert
- **Member**: of the JWST Observations of Young protoStars (JOYS) GTO Consortium
- **Member**: of the VVV/VVVX Survey team
- **Member**: of the "Sailing with the winds of HL Tau towards the origin of rings and gaps in protoplanetary disks" JWST Cycle 3 program
- **Member**: of the PROJECT-J JWST Cycle 1 program
- **Principal Investigator**: of "Microlensing events in the Milky Way bulge from the VVV data" funded by CONICYT
- **Member**: of ESO Vista Variables in the Via Lactea (VVV) and eXtended VVV (VVVX) Public Surveys (PI: Dante Minniti, Chile)

Seminars and Invited talks in conferences

- **12th Vista Variables in the Vía Láctea (VVV) Science Meeting collaboration meeting** (April 2025), Florianópolis, Brazil.
- **Seminar titled "Unveiling the Origin of Outflows in Young Stellar Objects with JWST: H2 Emission of the Class I Source HH46 IRS " at the Osservatorio di Arcetri** (September 2024), Florence, Italy.
- **JWST MIRI support scientist in IT ARC ALMA proposal preparation day** (March 2024), Bologna, Italy.
- **ALMA proposal preparation day, Members of the Italian ARC and of the Italian JWST Support Centre** (March 2024), Bologna, Italy.
- **Seminar titled "VVV Microlensing events as tracers of Galactic structure and kinematics" at the Osservatorio Astronomico di Roma** (March 2023), Rome, Italy.
- **Seminar titled "VVV Microlensing events around the Galactic Center" at the Dublin Institute for Advances Studies** (April 2022), Dublin, Ireland.
- **Seminar titled "Microlensing events with VVV Survey" at the Astronomical Observatory University of Warsaw** (May 2019), Warsaw, Poland.

Contributed talks in conferences [selected]

- **Lorentz Center workshop: Protostellar accretion and ejection with JWST and beyond** (May 2025), Leiden, Netherlands.
- **Italian national conference of star and planet formation** contributed talk titled: "Revealing the Early Stages of Protostellar Outflows with JWST: Insights from Molecular Emission in L1448 and HH46", (January 2025), Sesto, Italy.
- **Born in Fire: Eruptive Stars and Planet Formation** poster titled: "H2 molecular emission of Class I source HH46 IRS observed with JWST", (September 2024), Santiago, Chile.
- **Jets and Young Stars: the Passage from Discovery to JWST and Beyond** poster titled: "PROJECT-J: Exploring the Embedded Jet and Molecular Flow of the HH46 IRS Protostar with JWST", (September 2024), Dublin, Ireland.
- **JWST Observations of Young protoStars (JOYS) Consortium meeting** contributed talk titled: "Brief overview of NIRSpec data and data reduction", (September 2024), Castel Gandolfo, Italy.
- **European Astronomical Society Annual Meeting 2024** poster titled: "H2 molecular emission of Class I source HH46 IRS observed with JWST", (June 2024), Padova, Italy.
- **Science with the Hubble and James Webb Space Telescopes VII: Stars, Gas & Dust in the Universe** contributed talk titled: "PROJECT-J: the embedded jet and molecular flow of the HH46 IRS protostar observed with JWST", (April 2024), Porto, Portugal.
- **JWST Observations of Young protoStars (JOYS) Consortium meeting** contributed talk titled: "The case of HH46 and L1448mm", (December 2023), Leiden, Netherlands.
- **JWST Data Products Workshop** poster titled: "PROJECT-J MIRI and NIRSpec IFU observations of the HH46IRS protostar: a test case for the pipeline applied to a high contrast line to continuum emission.", (November 2023), Baltimore, USA.
- **The VVVX Survey: Exploitation and Future Infrared Synoptic Science** (October 2024), October, Italy.
- **European Astronomical Society Annual Meeting 2023** contributed talk titled: "PROJECT-J: The embedded jet and molecular flow of HH46 IRS observed with JWST ", (July 2023), Krakow, Poland.
- **Meeting Strade-YODA at Osservatorio di Capodimonte** (February 2023), Naples, Italy.
- **11th OPTICON Gaia Alerts Workshop** contributed talk titled: "VVV Microlensing events in the Galactic bulge", (January 2021), Warsaw, Poland (online).
- **XVI SOCHIAS Annual Meeting** (December 2020), Temuco, Chile (online).
- **Super VOSS: The Search for Extra-Astronomical Life** (September 2019), Castel Gandolfo, Italy.
- **10th Vista Variables in the Vía Láctea (VVV) Science Meeting** (August 2019), Hawaii, United States of America.
- **Galactic Dynamics in the era of Large Surveys**,Shanghai, China. - July 2019
- **MODEST-19. Star Clusters: from the Milky Way to the Early Universe**, Bologna, Italy. - May 2019
- **23rd International Microlensing Conference** (February 2019), New York, United States of America.
- **ESO Conference: The Galactic Bulge at the Crossroads** (December 2018), Pucón, Chile.
- **Survival of Dense Star Clusters in the Milky Way System** (November 2018), Heidelberg, Germany.
- **LSST – Large Synoptic Survey Telescope – Special Programs Workshop** (October 2018), Palermo, Italy.
- **Fifteenth Marcel Grossmann Meeting** (July 2018), Rome, Italy.
- **9th Vista Variables in the Vía Láctea (VVV) Science Meeting** (April 2018), Florianópolis, Brazil.
- **IV MAS Workshop** (January 2018), Machalí, Chile.
- **8th Vista Variables in the Vía Láctea (VVV) Science Meeting** (July 2017), Edinburgh, UK.
- **III MAS Workshop** (December 2016), Viña del Mar, Chile.

Computing and Programming Skills

- **Programming languages**: Large expertise in Python programming (e.g., for the analysis of data from the Vista telescope and of the time series for the search for microlensing events and variable stars and JWST data-reduction pipelines), C++ (for N-body simulations) and Fortran, Matlab, and R (Basic)

- **Software in data analysis**: Iraf, Sextractor, DS9, AstroConda, TOPCAT

- **Data cubes**: Experience in spectroscopic analysis of data cubes from various instruments (JWST-NIRSpec/MIRI, ALMA, MUSE, SINFONI).

- **Numerical Simulations**: Experience in the simulation of merging globular clusters in the center of the Milky Way via direct N-body integration, using a Hermite Integrator on GPUs, the HiGPUs code.

- **Databases**: Vast experience in data-handling of large databases and variability surveys (VVV, Gaia, OGLE, etc.).

- **Vitalsur (Health care company) data analysis**: automation of the company's base system. The code applies statistical analysis to evaluate the company's future growth and for the epidemiological study. The pipeline reads the data and computes the collections and payments, including zone and service type variants, generates massive transfers, differentiated payments, documents for hospitals and private clinics, writes emails, and more. The model is scalable for millions of workers.

Schools and courses

- **Scientific Communication in Astronomy School** (October 2021), INAF and Osservatorio Astronomico d'Abruzzo, Bertinoro, Italy.

- **GROWTH Astronomy School 2020 "The dynamic universe at all wavelengths"** (August 2020), Liverpool John Moores University, Liverpool, UK (online).

- **Summer School on Galactic Dynamics** (June 2019), Shanghai Jiao Tong University, Shanghai, China. Study the theoretical framework of Galactic dynamics and its application to the data through practical sessions.

- **Summer School: "Stellar Variability in the Era of Large Surveys"** (June 2018), Vatican Observatory, Castel Gandolfo, Italy. Lectures on stellar variability and research project using data from VVV and Gaia.

- **ESO/NEON Observing School at La Silla** (February 2018), European Southern Observatory, Santiago and La Silla Observatory, Chile. Two nights of observations with Danish and ESO NTT telescopes and data reduction with EsoReflex.

- **Workshop on using TOPCAT, STILTS, and ADQL on Astronomical databases** (October 2017), Instituto Milenio de Astrofísica (MAS), Santiago, Chile.

- **Sagan Exoplanet Summer Workshop** (August 2017), Pasadena, United States of America. Short talk and assistance in hands-on sessions.

- **Summer School: "Astrostatistics & Data Mining"** (September 2016), International Max Planck Research School for Astronomy & Cosmic Physics, Heidelberg, Germany,

- **Tutorial: "Astrostatistics and R"** (April 2016), Instituto Milenio de Astrofísica (MAS), Santiago, Chile.

- **Summer practice: "Image analysis"** (January 2015), Pontificia Universidad Católica de Chile, Santiago, Chile. Summer practice on Image analysis under the supervision of Prof. Franz Bauer (2015), reduction of IR images taken with the REM telescope at La Silla Observatory. I helped develop a pipeline for the semiautomated reduction of astronomical images of supernovas using IRAF and ISIS for the data.

- **Course: "Tools for Matlab"** (2010), Universidad Austral de Chile, Valdivia, Chile.

Additional Research and Observing Experience

- **ESO-Paranal Observatory** (6-8 December 2024), ERIS/UT4 VLT, GTO program ID: 114.273D.001.

- **MIRI (JWST) data handling** (2022-present), experience in JWST proposal preparation, pipeline use, and MIRI data processing, with special emphasis on MIRI imaging and Medium Resolution Spectroscopy.

- **VVV data analysis** (2015-2022), vast experience working with the data from the Vista telescope. Trial reduction with IRAF and Pyraf.

- **Project on variable stars** (2015), Santiago, Chile. Search for variable stars with the image subtraction technique using ISIS under Prof. Marcio Catelán (PUC) guidance.

- **Projects on astronomy data analysis** (2015), Santiago, Chile. Under Prof. Andrés Jordán's (PUC) guidance, the course consists of (1) studying planetary transit curves using Kepler data and estimating planetary system parameters. (2) Chemical abundance analysis of SDSS galactic spectra using the principal components analysis (PCA) technique. (3) Development of an observation proposal and spectroscopic follow-up of a set of eclipsing binaries with the PUCHEROS spectrograph located at the PUC observatory, and calculating the radial velocities using the cross-correlation function (CCF) to constrain the stellar masses of the binary system.

Teaching experience

- **Teaching assistant at Pontificia Universidad Católica de Chile**: (2014 - 2016) Planets in the Universe (AST1529), General Astronomy (AST0111-1), General Astronomy (AST0111), Physics I (FIS1510), General Physics (FIS109), General Astronomy (AST0111).
- **Laboratory assistant at Pontificia Universidad Católica de Chile**: (2014 - 2016) Physics for Medicine (FIS109M), Electricity and magnetism (FIS0153), General Physics (FIS109).
- **Tutorship on General Astronomy**: (2014) Given for students from the Syracuse University.

Organization Duties

- **SOC**: of the Lorentz Center workshop: Protostellar accretion and ejection with JWST and beyond (May 2025), Leiden, Netherlands
- **SOC**: of the 12$^{\text{th}}$ Vista Variables in the Vía Láctea (VVV) Science Meeting collaboration meeting (April 2025), Florianópolis, Brazil.
- **LOC**: Italian national conference of star and planet formation (January 2025), Sesto, Italy.
- **SOC**: of the Super VOSS: The Search for Extra-Astronomical Life (September 2019), Castel Gandolfo, Italy.

Outreach activities

- **Sguardi sul cielo del Lazio**: (2021 – 2022) Leader of the project for innovatively teaching astronomy with particular emphasis on the inclusion of minorities and visibility of women in science in schools with difficult access through the funds of the Lazio region/Italy (25k EUR). Rome, Italy.
- **AstroEdu**: (2020 – present) Professor of the web platform to teach astronomy and related sciences through online courses in Spanish.
- **Instagram account for science communication @Shotastronomico**: (2020 – present) Influencer, creator, and administrator of Instagram account for science communication in Spanish, Italian, and English.
- **Gruppo Benessere e Coesione - OAR**: (2024 – present) Member of the working group intended to develop activities to improve the working environment in the Observatory of Rome.
- **Media INAF**: (2023 – present) Collaboration in outreach activities and articles.
- **Estancia El Cuadro**: (2018 – present) Astronomer in charge of the activity "Maridaje Estelar". Casablanca, Chile.
- **AAS Journal Author Series**: (2021) Interview by Frank Timmes on Navarro et al. 2020b ApJ, 893, 65.
- **Ciencia en Chile**: (2020) Online astronomy course for general public Santiago, Chile.
- **Observatorio Astronómico Andino**: (2012 –2019) Leader of the group of astronomers for tourist astronomical visits. Santiago, Chile.
- **Servicio Nacional de Turismo (SERNATUR)**: (2017) Member of the team for the scientific tourism boost plan in Chile. Santiago, Chile.
- **Astroclub (Instituto Milenio de Astrofísica)**: (2017) Participation in the project that seeks to bring science to students in vulnerable areas under the Galileo Mobile methodology at the Differential school "Madre Tierra". Santiago, Chile.

Academic service

- **Peer reviewer**: in international journals; Astronomy & Astrophysics and The Astrophysical Journal

Spoken Languages

- **Spanish**:   Native Speaker
- **English**:   Fluent
- **Italian**:   Fluent

Extracurricular Activities

- **Marathon**:   Rome Marathon (2021), time 04h 07' 52"
  Ravenna Marathon (2022), time 03h 54' 53" (best official time)
- **Volleyball**:   University team member Pontificia Universidad Católica de Chile (2011 - 2015)
  Member of the country's national team, Region de los ríos, Chile (2005 - 2010)
- **Track and field**:   Member of the country's national team, Region de los ríos, Chile (2005 - 2010)