CV date	17/06/2025

Part A. PERSONAL INFORMATION

First Name	**Giovanni Marcello**		
Family Name	**Mirouh**		
Sex	Male	**Date of Birth**	14/03/1989
ID number			
URL Web	ugr.es/~gmm		
Email Address	gmm@ugr.es		
Open Researcher and Contributor ID (ORCID)	0000-0003-0238-8435		

A.1. Current position

Job Title	Emergía fellow – Investigador postdoctoral		
Starting date	15/05/2025		
Institution	Universidad de Granada		
Department/Centre	Departamento de física teórica y del cosmos		
Country	Spain	**Phone Number**	(+34) 613 009 508
Keywords	Stellar physics; stellar rotation; variable stars; evolution and stellar structure; stellar modelling		

A.2. Previous positions (Research Career breaks included)

Period	Job title / Name of Employer / Country
2024/04 – 2025/05	Doctor fuera de convenio / Instituto de Astrofisíca de Andalucía-CSIC / Spain
2021/12 – 2024/04	Postdoctoral research fellow / Universidad de Granada / Spain
2018/08 – 2021/08	Senior postdoctoral research fellow / University of Surrey / UK
2016/11 – 2018/08	Research fellow / International School of Advanced Studies (SISSA) / Italy
2017/09 – 2017/11	Visiting researcher / Max Planck Institut for Astrophysics (MPA) / Germany
2013/10 – 2016/10	PhD. student with teaching duties / Université Toulouse III / France
2011/04 – 2011/08	Research scholar (J-1 visa) / University of California, Santa Cruz / USA
2009/10 – 2013/09	Intern student (“normalien”) / Ecole Normale Supérieure / France

A.3. Education

Degree / Master / PhD	University / Country	Year
Doctorate in Astronomy, Space Science and Planetology	Université Toulouse III / France recognized by Universidad de Granada / Spain	2016
Masters degree in Physics	École Normale Supérieure de Cachan / France	2014
Masters degree in Astronomy, Astrophysics and Space Engineering	Université Paris 6 & Ecole Normale Supérieure / France	2012
Licence (Bachelor of Science) in Physics	Université Paris 6 & Ecole Normale Supérieure / France	2010

Part B. CURRICULUM SUMMARY

My research concentrates on the evolutionary dynamics and the asteroseismology of intermediate-mass stars. These stars rotate rapidly and have stellar companions: these effects thwart a good description of the stars, as both effects impact their structure and oscillations by distorting the stellar shape and modifying mode frequencies and geometries.

I thus developed strategies to leverage photometric data from space for these rapid rotators through asteroseismology. Notably, my contributions include the most comprehensive exploration of low-frequency oscillations in those stars, which shed light on the excitation and geometry of these oscillations. To derive accurate stellar masses, radii and ages, I developed innovative strategies for the forward modelling of centrifugally-flattened stars by associating the ESTER 2D models with the TOP 2D oscillation code that I co-developed. These techniques allow us to interpret spectroscopic measurements and the oscillations of flattened rotators, or use them to derive clusters ages. I also created a groundbreaking machine learning algorithm for oscillation mode classification to sort computed modes instantly with 96% accuracy, bringing out regular patterns in frequency spectra that are linked with otherwise elusive stellar parameters, guiding and automating our modelling efforts.
Moreover, I developed an expertise in evolution algorithms, such as the one I built for binary systems: by interpolating bespoke detailed grids of models, I showed that tides are inefficient in main-sequence stars – a result that contradicts earlier inferences. The underlying grids are accessible openly, and have triggered several collaborations, e.g. to constrain the chemistry of intermediate-mass planet hosts and the mass distribution of the first stars of the Universe, leading to a *Nature Astronomy* article. I also work on modelling M-type dwarf stars: despite representing 75% of all stars and harboring planets, their theoretical description relies on coarse assumptions. My aim is to upgrade models to constrain these stars precisely and assess their seismic potential: this will allow us to derive accurate parameters for these stars, and therefore for the rocky planets around them.
I am now a tenure-track Emergía fellow – the programme for the attraction of international talent, with stabilization, of the Junta de Andalucía – and the PI of my own project, which consists in connecting established and innovative techniques for asteroseismology of rotating stars in the framework of the PLATO mission (to be launched in 2026).

At this date, I have published 34 papers including 23 refereed articles for a total of 627 citations and a h-index of 12 (taken from ADS on 17/06/25), along with 7 catalogues. These works, mostly led in small teams where I always had a significant role, established my reputation as a world expert of rotating, binary, main-sequence stars. As such, I am a referee for *A&A* and *PRL*. I participated in 34 national and international conferences with talks or posters, including invited talks in 8 workshops and 3 international conferences, along with more than 20 invited seminars worldwide. In 2021 I organised an international conference on the asteroseismology of binary stars, and I will be the chair of the 2027 Kepler/TESS asteroseismology conference to take place in Cádiz with ~250 attendees.

I worked in numerous institutions in different countries: from my PhD in Toulouse (France, which received the Pierre Maury dissertation award) to postdocs in Trieste (Italy), Surrey (UK), and now in Granada, I have been involved in many research projects, contributing ideas and managing autonomous lines of research.
Along with visits in four research institutes (Munich, Tokyo, Tabriz, València), this led me to cultivate a dense network of collaborations in Spain (Granada, Madrid), Europe (Cambridge, Toulouse, Paris, Vilnius, Tautenburg…) and beyond (Miami, Urumqi, Melbourne) that I keep expanding further. Additionally, I have intensified collaborations with ground-based observation specialists and submitted five successful proposals (two of which I am PI) for spectroscopy and polarimetry of rapid rotators from the Pic du Midi and CFHT. I also belong to various asteroseismology networks, such as the Kepler, TESS and PLATO consortia, within which I published five articles.

Beyond research, I supervised seven final-year projects and taught for a total of 220 hours at Bachelor, Master, and PhD. levels in four countries, gave a Severo Ochoa excellence training course on (magneto)hydrodynamics, and just joined the teaching staff of the University of Granada. I am also very active in outreach : I developed and obtained funding for several projects that I presented them in front of a variety of audiences in dedicated events (open days, school events, planetarium lectures) in French, Italian and English.
Finally, as a postdoc representative and an equality, diversity and inclusion advisor, I contributed to anti-discrimination protocols, supporting Surrey's successful application to a Race equality bronze award and the upcoming IAA-CSIC second equality plan.

Part C. RELEVANT ACCOMPLISHMENTS

C.1. Most important publications in national or international peer-reviewed journals, books and conferences

Below is a selection of my most significant publications, all refereed and in Q1 journals. The complete list of 41 publications is available online. The first author is the corresponding author.

1 Gessey-Jones T., Sartorio N. S., Bevins H. T. G., […] Barkana R. (**Mirouh G. M.** 7h/9 authors), **The mass distribution of the first stars can be determined via the 21-cm signal**, 2025, *Nature Astronomy*. DOI: 10.1038/s41550-025-02575-x (24 pages, IAA press release)

2 Maldonado J., **Mirouh G. M.**, Mendigutía I., Montesinos B., Gragera-Más J. L., Villaver E., (2nd/6) **Intermediate-mass stars and the origin of the gas-giant planet-metallicity correlation**, 2025, A&A, 695, 27. DOI: 10.1051/0004-6361/20245332 (9 pages, IAA press release)

3 **Mirouh G. M.**, Hendriks D. D., Dykes S., Moe M., Izzard R. G. (1st/5), **Detailed equilibrium and dynamical tides: impact on circularization and synchronization in open clusters**, 2023, *MNRAS*, 524, 3978. DOI: 10.1093/mnras/stad2048 (22 pages, 9 citations)

4 Pamos Ortega D., **Mirouh G. M.**, García Hernández A., Suárez J. C., Barceló Forteza S. (2nd/5), **Dating young open clusters using δ Scuti stars. Results for Trumpler 10 and Praesepe**, 2023, *A&A*, 675, A167, DOI: 10.1051/0004-6361/202346323 (19 pages, 9 citations)

5 **Mirouh G. M.** (1st/1), **Forward modelling and the quest for mode identification in rapidly rotating stars**, 2022, *Frontiers in Astronomy and Space Sci*., 9, 2296, DOI: 10.3389/fspas.2022.952296 (19 pp., 10 citations).

6 Reese D. R., **Mirouh G. M.**, Espinosa Lara F., Rieutord M., Putigny B. (2nd/5) **Oscillations of 2D ESTER models. I. The adiabatic case**, 2021, *A&A*, 645, A46. DOI: 10.1051/0004-6361/201935538 (20 pages, 21 citations)

7 Antoci V., Cunha M. S., Bowman D. M. […] Weiss W. W. (**Mirouh G. M.** 53rd/66) **The first view of δ Scuti and γ Doradus stars with the TESS mission**, 2019, *MNRAS*, 490, 4040. DOI: 10.1093/mnras/stz2787 (20 pages, 106 citations)

8 **Mirouh G. M.**, Angelou G. C., Reese D. R., Costa G. (1st/4), **Mode classification in fast-rotating stars using a convolutional neural network: model-based regular patterns in δ Scuti stars**, 2019, *MNRASL*, 483, 28. DOI: 10.1093/mnrasl/sly212 (5 pages, 21 citations)

9 **Mirouh G. M.**, Baruteau C., Rieutord M., Ballot J. (1st/4), **Gravito-inertial waves in a differentially rotating spherical shell**, 2016, *Journal of Fluid Mechanics*, 800, 213, DOI: 10.1017/jfm.2016.382 (35 pages, 24 citations)

10 **Mirouh G. M.**, Garaud P., Stellmach S., Traxler A. L., Wood T. S. (1st/5), **A New Model for Mixing by Double-diffusive Convection (Semi-convection). I. The Conditions for Layer Formation**, 2012, *ApJ*, 750, 61, DOI: 10.1088/0004-637X/750/1/61 (18 pages, 85 citations)

C.2. Conferences and meetings

1 2023, 2024 – **Invited talks** at the 1st and 2nd Granada PLATO workshops, “Modelling rotation with 1D and 2D models” and “Low-mass stars: models and seismic potential”, IAA Granada.

2 2023/09 – **Invited review talk** at the 11th Applied Inverse Problems international conference, “Mode identification in rapidly-rotating stars: paving the way to inverse methods”, Göttingen (Germany).

3 2022/09 – Talk at the Reunión científica de la Sociedad Española de Astronomía, “Detailed equilibrium and dynamical tides: impact on circularization and synchronization in open clusters”, Universidad de la Laguna.

4 2021/01 – **Chair of SOC and LOC, review talk** (“Seismology of rotating stars”) of the “Pulsations in Intermediate-mass, Massive and/or Multiple Stars” International conference, Guildford (UK) – 1 week, 32 participants from Europe and Japan.

5 Since 2020 – **Invited review talk** (“Two dimensional models and oscillations”) and 4 participations at Iberian meetings in Asteroseismology.

6 2019/12 – **Organiser** of the binary_c workshop, Guildford (UK) – 1 week, 12 participants from the UK.

7 2018/02 to 2019/03 – Invited young scientist within the "Seismology of Fast Rotating Stars", ISSI Bern (Switzerland).

8 Since 2014 – 2 talks ("Gravitoinertial mode in fast-rotating stars", "Mode classification in fast-rotating stars using convolutional neural networks") and 2 posters at **international Corot, Kepler and TESS asteroseismology conferences**.

9 2014 – **LOC member and poster** contribution at the Corot/Kepler conference, Toulouse (France)

10 Since 2012 – **5 invited talks** and 10 participations to IRAP Stellar physics workshops, Toulouse (France)

C.3. Research projects and contracts

1 2025 – 2029 – EREBOS – Evolution of Rotation from Eclipsing Binary Oscillating Stars, **Emergía grant** from the Junta de Andalucía (2024) and Seal of excellence of the European Commission (2022). **212,540€.** 15/05/2025-14/05/2029, **PI: G. M. Mirouh.**

2 2024 – 2025 – Second-generation instrumentation (MOSAIC, ANDES) for the Extremely Large Telescope (ELT), Junta de Andalucía, 236,083€, 21/12/2023-30/09/2025, PI: P.J. Amado Gonzalez (IAA). My role: member as a senior postdoctoral fellow, computing models for the main targets of the science case.

3 2023 – ArQus European **collaboration visit** to Vilnius University (Lithuania). Invited talk "Asteroseismology of rapidly-rotating stars". ArQus alliance, 1,400€. **PI: G.M. Mirouh**.

4 2021 – 2024 – Spanish contribution to the PLATO 2.0 space mission. AEI, 277,000€. PI : J. C. Suárez (UGR). From 10/12/2022. My role: member as a research fellow.

5 2021 – 2023 – CHARROTS - Characterization of Rotating Stars. FEDER/Junta de Andalucía, 141,500€. PI: A. García Hernández (UGR). 01/03/2020-28/02/2023. My role: collaborator, models and oscillations.

6 2021 – **Pulsations in Intermediate-mass, Massive and/or Multiple Stars international conference**. Royal Astronomical Society & Surrey Institute of Advanced Studies, 3,300€. **PI: G. M. Mirouh.** 18/01/2021-22/01/2021.

7 2018 – 2021 – First population models of the most massive stars. Science and Technology Facilities Council, 499,400€. PI: R. G. Izzard. (University of Surrey, UK). 08/2018-10/09/2021. My role: member as a senior research fellow, lead researcher on the stellar structure and evolution algorithm parts of the project.

8 2016 – 2018 – Postdoctoral grant at SISSA (Italy). Italian Ministry for Education, Universities and Research, 48,672 €. **PI: G. M. Mirouh**, 01/11/2016 – 31/10/2018. My role: as a postdoctoral researcher leading my own research, I developed 2D seismic modelling tools.

9 2013 – 2016 – Merit-based PhD. fellowship. École Normale Supérieure de Cachan, 79,000€. **PI: G. M. Mirouh,** 01/10/2012-18/10/2016. My role: PhD. student with teaching duties. The funding covered my wage working on the ESTER project (Stellar evolution with rotation, 263,000€. PI: M. Rieutord.)

10 2011 – Chemical mixing in the interior of stars. National Science Foundation, 247,000€. PI: P. Garaud. (University of California Santa Cruz). 2008-2011. My role: predoctoral researcher.

C.4. Technology/Knowledge transfer

1 2017 to 2021 – PI, the "Sensory Universe" **outreach project, aimed at school and family audiences**. I received 220 € from the University of Surrey, presented in schools and Open Days in Italy and the UK.

2 Since 2019 – PI, "The music of stars" - **outreach project aimed at linking stellar oscillations and music**. I received 220 € from the University of Surrey, delivered invited lectures at the Winchester planetarium, the Guildford and Farnham astronomical societies (UK) and the Sirius conference (Constantine, Algeria).

3 2015 – Co-organiser, the **"Children's science conference" outreach event**, at the *Cité de l'Espace* (France). I supervised an elementary school class to prepare and present posters and talks in a dedicated conference.

4 2010/08 – Co-organiser, solidarity mission in Tanguiéta (Bénin). Linking an African primary school and the École Normale Supérieure, I organised a summer school and taught in a 30-pupil class for a month.