Clara Dehman

Curriculum Vitae

Personal Information

Department of Applied Physics,
Science Faculty II, University of Alicante,
Campus de San Vicente del Raspeig, s/n
03690 San Vicente del Raspeig, Alicante, Spain

Email: clara.dehman@ua.es
ORCID: 0003-0554-7286
Nationality: Lebanese
Date of Birth: *Sept 20th, 1996*

Education

Ph.D. in Physics – Autonomous Univ. of Barcelona, ES (Nov 2023)

- *Thesis Title:* Unveiling the Physics of Neutron Stars: A 3D expedition into MAgneto-Thermal evolution in Isolated Neutron Stars with "`MATINS`"
- *Honors:* Cum Laude distinction, International Mention, Excellent (A$^+$), Special Recognition by the SEA Thesis Award 2024, IEEC Best Thesis Award 2024.

International Joint Master in Theor. Nuclear Physics – Erasmus Mundus, NucPhys Program (Sept 2019)

Degrees Awarded:

i) Laurea Magistrale in Fisica – Univ. of Padova, IT

- *Honors:* 110/100 + Cum Laude

ii) Master de Sciences, Technologies, Santé, Mention Physique – Univ. of Caen Normandy, FR

- *Honors:* Very good

iii) Máster Universitario Erasmus Mundus en Física Nuclear – Autonomous Univ. of Madrid, Complutense Univ. of Madrid, Univ. of Barcelona, Univ. of Salamanca, and Univ. of Seville, ES.

- *Thesis Title:* Hot Neutron Rich Nuclear Matter Studied with the BCPM Nuclear Energy Density Functional
- *Honors:* 9.53/10 + Matrícula de honor

Bachelor's Degree in Physics – Lebanese Univ., Faculty of Sciences III, Tripoli, LB (Aug 2017)

- *Honors:* 1st rank in Physics department
- *Grade:* 79.64/100

Research Positions

Juan de la Cierva Postdoctoral Fellow, Univ. of Alicante, ES (Mar 2024 – Jan 2027)

- *Project:* Examining the role of chiral magnetic instability in explaining the origin of the strong, large-scale magnetic fields in magnetars.
- *Advisors:* Prof. Jose Pons

Transitional Postdoctoral Researcher, Inst. of Space Sciences, Barcelona, ES (Nov 2023 – Feb 2024)

- *Project:* Utilizing a 3D MHD code to model the evolution of magnetic fields in comparison with observational data of neutron stars.
- *Advisors:* Prof. Nanda Rea

Visiting PhD Fellow, NORDITA, Stockholm, SE (Apr – Dec 2023)

- *Project:* Understanding the role of magnetic helicity in the manifestation of the inverse cascade in the crust of neutron stars.
- *Advisors:* Prof. Axel Brandenburg

Research Positions (Continued)

Doctoral Researcher, Theor. Astrophysics, Inst. of Space Sciences, Barcelona, ES (Nov 2019 – Nov 2023)

- *Project:* Investigating the magneto-thermal evolution of isolated neutron stars, crucial for interpreting X-ray observations. Led the development of a novel 3D code, `MATINS` (MAgneto-Thermal evolution in Isolated Neutron Stars), serving as the primary developer.
- *Advisors:* Prof. José A. Pons, Prof. Nanda Rea & Dr. Daniele Viganò

Graduate Researcher, Theor. Nuclear Physics, Univ. of Barcelona, ES (Feb – Sept 2019)
(*Grade:* 10/10 + Matrícula de Honor)

- *Project:* Studying the thermal properties of the BCPM nuclear energy density functional, a unified equation of state for binary neutron star mergers and the late stages of proto-neutron stars.
- *Advisors:* Prof. Artur Polls, Prof. Xavier Viñas & Prof. Mario Centelles

Intern, Theor. Nuclear Physics, Lab. de Physique Corpusculaire, Caen, FR (Sept 2018 – Jan 2019)

- *Project:* Developing a model to describe experimental observations, specifically the neutron star mass-radius relation. This model, based on the Metamodeling technique, is a promising approach for handling various nuclear equations of state.
- *Advisors:* Prof. Francesca Gulminelli

Intern, Exp. Nuclear Physics, National Inst. for Nuclear Physics, Legnaro Labs., IT (Mar – Jun, 2018)

- *Focus:* Measuring the fusion cross section of a ^{28}Si beam on a ^{100}Mo target at various energies, with the goal of demonstrating the significance of the many-body quantum tunneling phenomenon.
- *Advisors:* Prof. Giovanna Montagnoli & Prof. Alberto Stefanini

Research Grants, Fellowships, and Scholarships

- **Jan 2025 – Dec 2026:** *Juan de la Cierva Fellowship,* Agencia Estatal de Investigacíon, ES; 72,000 € (PI)
- **Oct 2024 – Oct 2025:** *APOSTD Fellowship,* Generalitat Valenciana, ES; 92,470 € (PI) – DECLINED
- **Jan 2023 – Dec 2026:** *CIPROM 2022/13 Grant,* Generalitat Valenciana, ES; 584,000 €
- **Apr 2023 – Dec 2023:** *Visiting PhD Fellowship,* NORDITA, Stockholm, SE; 80,000 kr (PI)
- **Apr 2020 – Dec 2024:** *SGR-Cat 2021 (01269) Grant,* Generalitat de Catalunya, ES; 60,000 €
- **Jan 2020 – Feb 2023:** *Magnesia ERC Grant,* European Research Council; 2,000,000 €
- **Oct 2017 – Sep 2019:** *EACEA Scholarship,* Erasmus Mundus Joint Master Program, EU; 37,000 € (PI)
- **Sep 2012 – Jun 2014:** *English Micro-Scholarship Program,* American Embassy of Beirut, LB; 2,000 $ (PI)

Honors & Awards

- **Dec 2024:** *Best Thesis Award 2024, IEEC*, (1,000 € in Cash and 500 € for research)
- **May 2024:** *Special Mention, SEA Thesis Award 2024*, Awarded for outstanding research quality in a highly competitive category of theses
- **Nov 2023:** *Doctoral research component with Cum Laude distinction and International Mention,* Autonomous Univ. of Barcelona, ES
- **Mar 2019:** *Certificate in Data Analysis and Machine Learning,* Michigan State University (US) and University of Oslo (NO)
- **2017 – 2019:** *ERASMUS$^+$ Joint Master Program (NucPhys),* selected as the top 20% applications (CV & Interview) by an international selection committee
- **Mar 2014:** *Project Citizen Training and Showcase Certificate,* AMIDEAST Organization and American Embassy of Beirut, LB
- **Mar 2013:** *Intel Youth Innovation Camp Certificate,* INJAZ Organization, Beirut, LB
- **Feb 2013:** *Personal Strategic Planning Certificate,* International Academy of Personal Training and Leadership Development (IAPTLD), Tripoli, LB
- **Jul 2012:** *Leadership Program Certificate,* AMIDEAST & INJAZ Organizations, Beirut, LB

Invited Talks & Seminars

- **May 2025:** *Talk,* Extreme Physics of Neutron Star Interiors, Princeton Univ., USA
- **May 2025:** *Talk,* Workshop on Modern EoS and Spectroscopy in NS, Alcala Univ., ES
- **Feb 2025:** *Talk,* Fukuoka Univ., JP
- **Dec 2024:** *Review Talk,* IReNA-INT Joint Workshop on Thermal and Magnetic Evolution, Univ. of Washington, USA
- **Sept 2024:** *Talk,* Frontier workshop, Palermo, IT
- **Jun 2023:** *Astrophysics Seminar,* Department of Astronomy and Astrophysics, Univ. of Valencia, ES
- **May 2023:** *Astrophysics Seminar,* NORDITA, Stockholm, SE
- **Jun 2022:** *Astrocoffee Seminar,* Goethe Univ., DE (online)
- **May 2022:** *Nucphys Master Program Seminar,* GANIL Facilities, FR (online)
- **Dec 2021:** *Hadronic, Nuclear & Atomic Physics Seminar,* Univ. of Barcelona, ES
- **Nov 2021:** *Astrophysics Seminar,* Univ. of Alicante, ES
- **Dec 2020:** *Stars & Compact Objects Meeting,* Flatiron Inst., New York City, US (online)
- **Mar 2019:** *Seminar, Hadronic, Nuclear & Atomic Physics Group,* Univ. of Barcelona, ES

Teaching Experience (62.5 Lecture Hours Total)

Invited Lecture, Master Seminar, Univ. of Alicante, ES (May 2025)
Research in Computational Astrophysics — **1 hr** — 10 MSc students
Duties: Delivered a one-hour seminar presenting my research work to Master's-level students.

Lecturer, Dept. of Applied Physics, Univ. of Alicante, ES (Jan–Mar 2025)
Stellar Astrophysics — **12 hr** — 14 BSc students
Duties: Taught theoretical lectures & led labs (Python coding, troubleshooting, grading).

Instructor, Dept. of Applied Physics, Univ. of Alicante, ES (Oct 2024)
Nuclear and Particle Physics — **27 hr** — 56 BSc students
Duties: Designed & led labs (Python coding guidance, issue resolution, assessment).

Instructor, Dept. of Applied Physics, Univ. of Alicante, ES (Sept–Oct 2024)
Introduction to Modelling in Physics — **22.5 hr** — 47 BSc students
Duties: Supervised labs (Python coding assistance, troubleshooting, evaluation).

Contributed Talks, Seminars & ePosters

- **July 2024:** *Talk,* The 10$^{\text{th}}$ International Conference on Quarks and Nuclear Physics, Univ. of Barcelona, ES
- **Jun 2024:** *Talk,* XMM-Newton Workshop 2024, Madrid, ES
- **May 2024:** *Special Seminar,* Inst. of Space Sciences, Barcelona, ES
- **Apr 2024:** *Astrophysics Seminar,* University of Alicante, ES
- **May 2022:** *Talk,* Pharos Conference, Univ. of La Sapienza, Rome, IT
- **Mar 2022:** *Seminar,* Inst. of Space Sciences, Barcelona, ES
- **Nov 2021:** *Talk,* IAU Symposium 363 (online)
- **Jun 2021:** *Talk & ePoster,* European Astronomical Society (EAS), Annual Meeting 2021 (online)
- **Mar 2021:** *ePoster,* A Precursor View of The SKA Sky (online)
- **Nov 2020:** *Seminar,* Inst. of Space Sciences, Barcelona, ES
- **Mar 2020:** *Talk,* PHAROS Conference, Patras, GR (canceled due to Covid−19)

Scientific Community Services

Supervision

- **PhD Student** Joan Llorens Ripoll — co-supervisor (main supervisor: J. A. Pons), University of Alicante, ES (since March 2025)

Scientific Community Services (Continued)

Reviewing and Refereeing Activities

- **Dec 2025:** *PhD Thesis committee,* Juan Antonio Gil Granados, University of Barcelona, ES.
- **Since Aug 2024:** *Reviewer,* Nature Astronomy Journal
- **Since Mar 2024:** *Reviewer,* Frontiers in Astronomy and Space Sciences Journal
- **Since Aug 2023:** *Reviewer,* Journal of physics G: Nuclear and Particle Physics
- **Since Feb 2023:** *Reviewer,* Monthly Notices of the Royal Astronomical Society Journal
- **Since Jul 2022:** *Reviewer,* Classical and Quantum Gravity Scientific Journal

Scientific Meeting Organisation

- **Nov 2022:** *LOC,* 3rd Athena Conference, Barcelona, ES
- **May 2022:** *LOC,* Pharos Conference, Rome, Italy

Computational Skills & Background Knowledge

Code Developer (since Sept 2020)**:** Principal developer of `MATINS`, a 3D code for MAgneto–Thermal evolution in Isolated Neutron Stars. Mostly focused on developing the cubed-sphere grid and the magnetic field formalism.

- *Programming Language:* The code is written in Fortran90 and it uses OpenMP to optimize the main loops. The code is faster when compiled with Intel compilers, compared to GNU.

Good Knowledge: Fortran90, Fortran77, C, Python, Github, Linux, Gnuplot, Latex

Intermediate Knowledge: C++, Root Data Analysis Framework, Java, Matlab

Community Involvement & Outreach Activities

Outreach Activities

- **Nov 2022:** *Astronomical Observation,* Contribution to the organization of astronomical observation, Autonomous Univ. of Barcelona, ES
- **Feb 2022:** *Outreach talk,* International Day of Girls and Women in Science, Inst. of Space Sciences, ES
- **2021 – 2023:** *Magnet ICE.* The educational program is designed to combat school segregation in Catalonia, ES. My responsibility involves assisting the teachers at Gabriel Castellà i Raich, a public school in Igualada facing challenges with student integration, in creating innovative and engaging scientific projects for their students

Invited Interview

- **Jun 2024:** *Invited Interview,* Elche University, ES
- **Dec 2023:** *Invited Interview,* Inst. of Space Science, Barcelona, ES

Volunteering

- **2014 – 2017:** *Member of Caritas,* Tripoli, LB
- **2006 – 2014:** *Member of Les Scout du Liban,* aint Michael & Notre Dame Carmel Groups, Tripoli, LB

Press Releases

- **Jul 2024:** *Descubren tres estrellas de neutrones jóvenes inusualmente frías para su edad,* europapress
- **Jul 2024:** *Investigadores de la UA detectan estrellas de neutrones inusualmente frías,* TODOAlicante
- **Jul 2024:** *Investigadores de la UA participan en el descubrimiento de tres estrellas de neutrones demasiado frías para su edad,* Actualidad Universitaria
- **Jun 2024:** *NASA's Chandra Peers Into Densest and Weirdest Stars,* NASA
- **Jun 2024:** *Too young to be so cool: lessons from three neutron stars,* ESA
- **Jun 2024:** *Un equip d'astrònoms de l'IEEC descobreix tres estrelles de neutrons massa fredes per a la seva edat,* IEEC
- **Jun 2024:** *Troppo giovani per essere così fredde,* MEDIA INAF
- **Jun 2024:** *A team of ICE-CSIC astronomers discovers three neutron stars too cold for their age,* ICE-CSIC

Press Releases (Continued)

- **Dec 2022:** *Astronomers observe outburst of the young magnetar Swift J1818.0–1607,* Phys Org
- **Jun 2020:** *NASA discovers youngest 'cosmic baby' neutron star,* Independent
- **Jun 2020:** *Astronomers just discovered the youngest ever 'baby' dead star,* CNET
- **Jun 2020:** *Astronomers find baby pulsar – a rare magnetar – born just 240 years ago,*Astronomy Now
- **Jun 2020:** *Astronomers discover youngest magnetar ever,* Sci News
- **Jun 2020:** *Hallan estrella 'bebé' que explica origen de las explosiones en el universo,* La Vanguardia

Attended Schools & Meetings

- **Sept 2024:** *Pencil Code User Meeting,* Inst. of Space Sciences, Barcelona, ES
- **Jun 2023:** *School for Astrostatistics,* Crete, GR
- **Apr 2023:** *Fluid Mechanics of Planets and Stars,* Udine, IT
- **Jul 2021:** *4^{th} Inst. of Space Sciences Summer School: Artificial intelligence for astronomy,* Barcelona, ES
- **Nov 2019:** *XXXI Canary Islands Winter School of Astrophysics: computational fluid dynamics in astrophysics,* Univ. of La Laguna, Tenerife, ES
- **Sept 2019:** *Physics and Astrophysics of Gravitational Waves,* Bad Honnef Physics School, DE
- **Jan 2019:** *Data Analysis and Machine Learning Winter School,* GANIL Facilities, Caen, FR
- **Aug 2018:** *Programming Languages Summer School,* Univ. of Caen Normandy, FR

Membership in Collaborations

- **since Sept 2022:** Einstein Telescope Collaboration
- **since Mar 2022:** AIHUB, Artificial Intelligence Initiative of Spain's National Research Council
- **since Mar 2021:** *Ordinary Member,* European Astronomical Society (EAS)
- **2019 – 2022:** PHAROS (European COST Action CA16214)

Languages

Arabic	C2	*Mother Tongue*
French	C2	*Fluent in Communicative and Academic Aspect*
English	C2	*Fluent in Communicative and Academic Aspect*
		Advanced Cambridge Certificate: 183/210 *(Apr 2019)*
		TOEFL: 805/900 *(2014)*
Spanish	B2	*Intermediate*
Italian	B2	*Intermediate*

List of Publications

A full list of papers can be found on the online databases ADS, arXiv, ORCID or Google Scholar.

Submitted:

20. C. Dehman & J.A. Pons: 2025. **Magnetar field dynamics shaped by chiral anomalies and helicity**. Submitted for publication (arXiv:2505.06196,ADS).

19. A. Suvorov, C. Dehman & J.A. Pons: 2025. **Revealing the nature of ultra-long period objects with space-based gravitational-wave interferometers**. Submitted for publication (arXiv:2505.06125,ADS).

18. A. Suvorov, C. Dehman* & J.A. Pons: 2025. **Late-blooming magnetars: awakening as ultra-long period objects after a dormant cooling epoch**. Submitted for publication *(equal contributions by first two authors; corresponding author: C. Dehman).* (arXiv:2505.05373,ADS).

Published:

17. C. Dehman & A. Brandenburg: 2025. **Reality of inverse cascading in neutron star crusts**. *A&A* 694, A39 (arXiv:2408.08819,ADS,DOI).

16. S. Ascenzi, D. Viganò, C. Dehman, J.A. Pons, N. Rea & R. Perna: 2024. **3D code for MAgneto−Thermal evolution in Isolated Neutron Stars, MATINS: thermal evolution and light curves**. *MNRAS* 533 201 (arXiv:2401.15711,ADS,DOI).

15. C. Dehman, M. Centelles & X. Viñas: 2024. **Impact of Hot Inner Crust on Compact Stars at Finite Temperature**. *A&A* 687, A236 (arXiv:2401.16957,ADS,DOI).

14. A. Marino*, C. Dehman*, K. Kovlakas*, N. Rea* et al.: 2024. **Constraints on the dense matter equation of state from young and cold isolated neutron stars**. *Nature Astronomy 8, 1020–1030* (arXiv:2404.05371,ADS,DOI). *"These authors contributed equally to this work".*

13. J. Urbàn, P. Stefanou, C. Dehman & J.A. Pons: 2023. **Modelling force-free neutron star magnetospheres using physics-informed neural networks**. *MNRAS* 524 32 (arXiv:2303.11968,ADS,DOI).

12. C. Dehman, D. Viganò, S. Ascenzi, J.A. Pons & N. Rea: 2023. **3D evolution of neutron star magnetic-fields from a realistic core-collapse turbulent topology**. *MNRAS* 523 5198 (arXiv:2305.06342,ADS,DOI).

11. C. Dehman, J.A. Pons, D. Viganò & N. Rea: 2023. **How bright can old magnetars be? Assessing the impact of magnetized envelopes and field topology on neutron star cooling**. *MNRAS Letters* 520 42 (arXiv:2301.02261,ADS,DOI).

10. A.Y. Ibrahim, A. Borghese, N. Rea et al.: 2023. **Deep X-ray and radio observations of the first outburst of the young magnetar Swift J1818.0-1607**. *ApJ* 943 20 (arXiv:2211.12391,ADS,DOI).

9. C. Dehman, D. Viganò, J.A. Pons & N. Rea: 2022. **3D code for MAgneto−Thermal evolution in Isolated Neutron Stars, MATINS: the magnetic field formalism**. *MNRAS* 518 1222 (arXiv:2209.12920,ADS,DOI).

8. N. Rea, F. Coti Zelati, C. Dehman et al.: 2022. **Constraining the nature of the 18 min periodic radio transient GLEAM-X J162759.5-523504.3 via multi-wavelength observations and magneto-thermal simulations**. *ApJ* 940 72 (arXiv:2210.01903,ADS,DOI).

7. F. Anzuini, A. Melatos, C. Dehman, D. Viganò & J.A. Pons: 2022. **Thermal luminosity degeneracy of magnetized neutron stars with and without hyperon cores**. *MNRAS* 515 3014 (arXiv:2205.14793,ADS,DOI).

6. F. Anzuini, A. Melatos, C. Dehman, D. Viganò & J.A. Pons: 2022. **Fast cooling and internal heating in hyperon stars**. *MNRAS* 509 2609 (arXiv:2110.14039,ADS,DOI).

5. D. Viganò, A. Garcia-Garcia, J.A. Pons, C. Dehman & V. Graber: 2021. **Magneto-thermal evolution of neutron stars with coupled Ohmic, Hall and ambipolar effects via accurate finite-volume simulations**. *Computer Physics Community* 265 108001 (arXiv:2104.08001,ADS,DOI).

4. A.M. Stefanini, G. Montagnoli, M. D'Andrea, M. Giacomin, C. Dehman et al.: 2021. **New insights into sub-barrier fusion of ^{28}Si + ^{100}Mo**. *J. of Phys. G* 48 055101 (ADS,DOI).

3. F. Coti Zelati, A. Borghese, G.L. Israel et al.: 2021. **The new magnetar SGR J1830-0645 in outburst**. *ApJL* 907 *L*34 (arXiv:2011.08653,ADS,DOI).

List of Publications (Continued)

2. C. Dehman, D. Viganò, N. Rea, J.A. Pons, R. Perna & A. Garcia-Garcia: 2020. **On the rate of crustal failures in young magnetars**. *ApJL* 902 *L*32 (arXiv:2010.00617,ADS,DOI).

1. P. Esposito, N. Rea, A. Borghese et al.: 2020. **A very young radio-loud magnetar**. *ApJL* 896 *L*30 (arXiv:2004.04083,ADS,DOI).