MINISTERIO DE CIENCIA E INNOVACIÓN

Cofinanciado por la Unión Europea

AGENCIA ESTATAL DE INVESTIGACIÓN

CURRICULUM VITAE (CVA)

IMPORTANT – The Curriculum Vitae cannot exceed 4 pages. Instructions to fill this document are available in the website.

Part A. PERSONAL INFORMATION

CV date	1-11-2021

First name	Carlos A.		
Family name	Abia Ladrón de Guevara		
Gender (*)	Hombre	Birth date (dd/mm/yyyy)	06/04/1962
Social Security, Passport, ID number	22944439F		
e-mail	cabia@ugr.es	http://wpd.ugr.es/~fqm292/members/carlos-abia/	
Open Researcher and Contributor ID (ORCID) (*)	0000-0002-5665-2716		

(*) Mandatory

A.1. Current position

Position	Catedrático de Universidad			
Initial date	9-8-2009			
Institution	Universidad de Granada			
Department/Center	Dpto. Física Teórica y del Cosmos.	Facultad de Ciencias		
Country	Spain		Teleph. number	+34 958249061
Key words	Stellar evolution, nucleosynthesis, stellar abundances, chemical evolution, nuclear astrophysics, computational astrophysics			

A.2. Previous positions (research activity interuptions, art. 14.2.b))

Period	Position/Institution/Country/Interruption cause
1995-2009	Prof. Titular de Universidad. Universidad de Granada

A.3. Education

PhD	University/Country	Year
Physics	Universidad de La Laguna, Spain	1989

Part B. CV SUMMARY *(max. 5000 characters, including spaces)*

My research mainly deals with the observational (high resolution optical and near infrared spectroscopy) and theoretical (radiative transfer and stellar models) study of low and intermediate mass stars (< 8 $M_{\odot}$), from the main sequence until the AGB phase. In particular, I'm interested in the detailed chemical composition of these stars in light (Li, F, C, N, O) and heavy (A>70) elements, the latter produced through the s- and r-processes. I also study the contribution of these stars to the abundance of these elements in the universe. I'm familiar with the use of spectral synthesis techniques (both in LTE and N-LTE), and stellar evolution and nucleosynthesis numerical codes. I use the outputs of these chemical analyses and numerical simulations in the study of the chemical evolution of the Galaxy through the corresponding

numerical codes. I have developed most of the numerical codes I use. In the very recent years, I have been involved in the exploitation of the several astronomical surveys/instruments as *GAIA*, CARMENES and/or AMBRE for the characterisation of the evolutionary status of the *AGB stars* of different spectral types. All these studies have been financially supported by national and international (EU) research projects. In total I have more than 140 publications, 66 referred articles included in the JCR, 53 in the Q1, 52% as first author, 76% as first or second author. My h-index is 35 (source ADS & Google Scholar), i-10 index 49, and more than 3000 citations. I have directed two PhD. Thesis in the last 10 years and several master thesis and Graduate works.

Part C. RELEVANT MERITS

In the last 10 years, my more relevant scientific merits would be:

- First detailed study of the chemical composition of the extragalactic AGB carbon stars.
- An observational and theoretical study of the dependence on the stellar metallicity of the s-process nucleosynthesis.
- To demonstrate that the C, N and O ratios observed in AGB stars require the existence of non-standard mixing processes during this phase of stellar evolution. The origin of these processes is still unknown.
- First realistic determination of the contribution of AGB stars to the cosmic abundance of fluorine.
- The discovery of observational evidence that mainstream pre-solar grains of type AB may have their origin in J-type carbon stars.
- Estimation of the role played by rotational massive stars (core collapse supernovae) in the chemical evolution of the Galaxy in particular, on their contribution to the weak s-process.
- A new assessment of the s- and r-process contributions to the Solar System composition.
- SPH hydrodynamical simulations of a brown dwarf engulfment by a solar-type star and its impact on the Li surface abundance.

Apart of the above-mentioned items, which I'll continue to study, I'm currently studying the chemical evolution of the heavy elements (s- and r-elements) in our galaxy evaluating the impact of the stellar migration in the observed abundance patterns in the thin and thick disk of the Galaxy. In a near future this study will be extended to other element isotopes as ^{13}C, ^{14}N, ^{18}O etc. On the other hand, I am also interested in the chemical characterization of the most massive AGB stars and, on the impact of the occurrence of the combustion in the bottom of the convective envelope in the surface composition. Furthermore, I currently doing 3D hydrodynamical simulations of the accretion brown dwarfs/planets by low mass stars and its impact on the surface composition and star's structure and evolution

C.1. Publications

Most relevant in the last 10 years

- *Nitrogen Isotopes in Asymptotic Giant Branch Carbon Stars and Presolar SiC Grains: A Challenge for Stellar Nucleosynthesis*, R. Hedrosa, **C. Abia**, et al., 2013, Astrophysical Journal, 768, L11-L15.
-*The origin of fluorine: abundances in AGB carbon stars revisited.* **C. Abia**, K. Cunha, S. Cristallo, P. de Laverny. 2015, Astronomy & Astrophysics, 581, 88ª.
-*The puzzle of the CNO isotope ratios in asymptotic giant branch carbon stars*, **C. Abia**, et al., 2017, A&A, 599, 39.
- *Chemical evolution with rotating massive star yields - I. The solar neighbourhood and the s-process elements*. N. Prantzos, **C. Abia**, et al. 2018, MNRAS, 476, 3432.
- *Properties of carbon stars in the solar neighbourhood based on Gaia DR2 astrometry*. **C. Abia**, P. de Laverny et al. 2019, Astronomy & Astrophysics, 633, 135A.
- *The CARMENES search for exoplanets around M dwarfs: Rubidium abundances in nearby cool stars*. **C. Abia** et al., 2020, Astronomy & Astrophysics, 642, 227A.

- *Chemical evolution with rotating massive star yields II. A new assessment of the solar s- and r-process components*. N. Prantzos, **C. Abia** et al., 2020, MNRAS, 491, 1832.

- *3D hydrodynamical simulations of a brown dwarf accretion by a main-sequence star and its impact on the surface Li abundance*. **C. Abia** et al., 2020, Mem Soc. Astr. Italiana, 91, 48.

- *Rubidium abundances in solar metallicity stars*. **C. Abia** et al. 2021, Astronomy & Astrophysics, 648, A107.

- *Magnetic-buoyancy-induced mixing in AGB stars: Fluorine nucleosynthesis at different metallicities*. D. Vescovi, S. Cristallo, S. Palmerini, **C. Abia,** M. Busso, 2021, Astronomy & Astrophysics, 652, A100.

C.2. Congress

Invited contributions in international congress ONLY in the last 10 years

- 3D hydrodynamical simulations of a brown dwarf accretion by a main-sequence star and its impact on the surface Li abundance. *In Li in the Universe: To Be or not -to Be? Frascati, 2019.*
- Observational Constraints on Nucleosynthesis from AGB and Post-AGB Stars in Our Galaxy and Its Satellites. *XV Nuclei in the Cosmos, Asergi, 2019.*
- A new assessment of the Solar System s- and r-processes components. *In Solvay Congress, Brussels, 2019.*
- High-Resolution Spectroscopy of AGB Carbon stars in the Local Group. *Present and Future of Optical and Infrared Astronomy: Synergies between China and Spain. Beijing, 2019.*
- Isotopic ratios of C, O and light element abundances in AGB stars undergoing Hot Bottom Burning. *The AGB-supernova mass transition, Monte Porzio, Frascati, 2017.*
- The puzzle of the CNO isotope ratios in AGB carbon stars. *The XII Torino Workshop and IV CSFK Astromineralogy Workshop, Budapest, 2016.*
- Nitrogen isotopic ratios in Galactic carbon stars. *XII Nuclei in the Cosmos, Cairns, 2012.*

C.3. Research projects

- Dos Retos en Evolución Estelar Moderna: Estrellas AGB y Progenitores de Supernova, 2009-2012, AYA-2008-04211-C02-02. PI.: I. Domínguez. Collaborator, Grant: 43000 €

- La Producción de Flúor en las Estrellas AGB, 2010, FPA2008-03908-E. P.I.: Carlos Abia, Grant: 3.600 €.

- First Azarquiel School in Astronomy, 2010, CSO2009-05461-E. P.I.: Carlos Abia (co-PI), Grant: 25.000 €.

- Theoretical and Observational Analysis of the Late Phases of the Stellar Evolution: Missing Physical Processes in AGB Stars and Thermonuclear Supernovae, 2012-2015, AYA-2011-22460, P.I.: I. Domínguez. Collaborator. Grant: 116.000 €.

- Las Estrellas de Masa Baja e Intermedia como Motores de la Evolución Química de las Galaxias, Progenitores de Supernova Termonucleares y Laboratorio de Astropartículas I. 2015-2018, AYA2015-63588-P, P.I.: Carlos Abia (co-PI). Grant: 61589 €.

- Las Estrellas de Masa Baja e Intermedia como Motores de la Evolución Química, Progenitores de Supernova y Laboratorio de Astropartículas II. 2018-2021, PGC2018-095317-B-C21, P.I. Carlos Abia. Grant: 32000 €.

- CA18104 - Revealing the Milky Way with Gaia (COST). Collaborator. 2019-2023.
- CA16117 – ChETEC. Chemical Elements as Tracers of the Evolution of the Cosmos. Collaborator. 2016-2021.

- OC-2021-1-25435 – Network of Computation Astronomy and Physics (COST). Collaborator. 2022-2026. Submitted.

C.4. Contracts, technological or transfer merit

- Contract in a Master Course at the Universitá Tor Vergata (Roma III, 2013). Duration: 15 days
- Contract as " Visiting Research" in the Observatoire de la Côte d'Azur (2018): Duration: 1 month.
- Contract as "Visiting Research" in the Observatoire de la Côte d'Azur (2021): Duration: 1 month.