

Part A. PERSONAL INFORMATION

First name	Francisco		
Family name	Salesa Greus		
Gender (*)	Male	Birth date (dd/mm/yyyy)	
Social Security, Passport, ID number			
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Open Researcher and Contributor ID (ORCID)			0000-0002-8610-8703

A.1. Current position

Position	Personal Científico Titular		
Initial date	26-12-2024		
Institution	Consejo Superior de Investigaciones Científicas (CSIC)		
Department/Center	IFIC	Instituto de Física Corpuscular	
Country	Spain	Teleph. number	963543538
Key words	Multi-messenger astronomy, Neutrino telescopes, Cosmic- and Gamma-Ray observatories		

A.2. Previous positions (research activity interruptions, indicate total months)

Period	Position/Institution/Country/Interruption cause
08/2019 - 12/2024 (64 months)	Distinguished researcher – CIDEAGENT, CSIC, IFIC (Spain)
01/2021 - 03/2021 (1.5 months)	Paternity leave
09/2015 - 11/2021 (48 months*)	Adjunct at Institute of Nuclear Physics - Polish Academy of Sciences, Poland [*on leave from 08-2019 to 10-2021]
09/2013 - 08/2015 (24 months)	Research Associate at Penn State University (PSU), USA
01/2011 - 08/2013 (32 months)	Postdoctoral at Colorado State University (CSU), USA

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
PhD (Doctor)	Universitat de València	2010
Diploma Estudios Avanzados	Universitat de València	2006
Physics degree (Licenciado)	Universitat de València	2003

(Include all the necessary rows)

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

I am a **CSIC Research Staff** (2004). In 2003, I got my Physics degree at Universitat de València (UV). Since then, Astroparticle Physics has been my main research field. **I have worked on five of the main experiments:** ANTARES, Auger, HAWC, CTA and KM3NeT. The common goal of all of them is to identify the sources of the most energetic cosmic rays, which has been my primary research topic. For my PhD I worked for the ANTARES neutrino telescope at the “Institut de Física Corpuscular (IFIC)” in Valencia, with a FPI grant. My thesis covered the **search for cosmic neutrino sources** and the **time calibration** of ANTARES. I defended my thesis in **Nov 2010** with the title “Time Calibration and Point Source Analysis with the ANTARES Neutrino Telescope” and received the “**Premi Extraordinari de Doctorat**” in 2012 for outstanding theses at UV.

In Jan 2011, I started a postdoc at **Colorado State University (CSU)** where I worked on two projects: The Pierre Auger Cosmic Ray Observatory and the HAWC Gamma-Ray Observatory. I worked on the assembly and operation of a water Cherenkov detector prototype of HAWC. My main task was the charge calibration of the HAWC PMTs. In the Auger Collaboration, I worked on the **search for Galactic neutron sources** which was later **published in ApJL**. The results of these searches significantly constrain the models in which the observed EeV protons are produced by candidate sources in the Galaxy. Moreover, I pioneered the anisotropy studies using the infill array of Auger, which is a smaller array embedded in the main detector.

In Aug 2013, I got a Research Associate position at **Penn State University**, where I continued my work on HAWC and Auger projects. HAWC started taking data in August 2013 and I was

involved in data analysis. My work on the **analysis of the Crab Nebula** was crucial for understanding the detector's performance. I was one of the main contributors to the paper **published in ApJ** on the observation of the Crab Nebula by HAWC.

In September 2015, I started a postdoc at the **Institute of Nuclear Physics (IFJ)** in Krakow (Poland), to work on HAWC. In Nov 2017, I secured a four-year tenure-track position at IFJ. During that time, I was the **IFJ representative** in the HAWC Collaboration (2016-2017) and a **member of the Speakers Committee** (2018-2019). My main analysis was the study of the extended TeV sources in the Geminga region and the implications to the PAMELA positron excess. The conclusion of my work was that leptons accelerated by these sources are unlikely to be the origin of the excess. **This work had a big impact and was published in Science.** To date, this is **the most cited publication by HAWC**. Later, I worked on the **high-energy (>50TeV) Galactic sources** and the **Galactic diffuse emission** analyses with HAWC. In the latter topic, I supervised a PhD student.

In 2019, I received a **CIDEGENT excellence grant** for a Distinguished Researcher position at IFIC, which is my current position. At IFIC, I worked part time on HAWC and **published the analysis of the high-energy source HAWC1825-134 in ApJL**. This source is likely to be emitting cosmic rays of $\sim$ PeV, which is a key energy range to understand the origin of the Galactic cosmic rays. This source is also interesting as it is well-located to be detected by KM3NeT, which would be crucial to identify the acceleration mechanism of the source. Presently, most of my time is spent on the ANTARES and KM3NeT projects. At IFIC my main research topic is the search for cosmic neutrino sources. In this sense, I am **supervising three PhD students** who work on the search for neutrino sources in the **multi-messenger astronomy** context. Moreover, I am the current **coordinator of the Astrophysics Working Group of ANTARES**, and the current contact person of ANTARES and KM3NeT with HAWC and LHAASO collaborations. I am also an **internal reviewer of ANTARES and KM3NeT analyses**, I have been **referee of Science and ApJ**, and **invited editor at JINST**. Furthermore, part of my time is dedicated to the calibration of KM3NeT, specifically working on the optical system based on pulsed light sources called "nanobeacons", which was developed at IFIC. I published a **paper in NIMA** on this system. I also supervise a student working on the timing calibration of KM3NeT using the nanobeacon system. I was the **PI of a CSIC project for European Research Infrastructures** (2023-2025). I am participae, as a **CSIC PI**, of an **HORIZON-CSA project** (2023-2025). I am the **PI of a Consolidación Investigadora project** (2024-2026). I am the **PI of PGC** (PID2024) project (2025-2028). I served on the **organizing committee** of the VLVnT2021 and TeVPA conferences, and in the **scientific committee** of the 2nd "Town Hall KM3NeT Meeting". I had an **invited lecture** (2h) for the Master de "Física Avanzada" of the UV. I did several **outreach activities**: Expociencia (IFIC), Workshop for educators (PSU, 2014), posters for the HAWC inauguration (2015), Astrofest (PSU, 2015), press articles, high school talks.

Part C. RELEVANT MERITS (*sorted by typology*)

C.1. Publications (*see instructions*)

1) "Extended gamma-ray sources around pulsars constrain the origin of the positron flux at Earth", HAWC Collaboration, *Science*, 358, Issue 6365, 911 (2017). **Corresponding Author (CA)**. DOI: <https://doi.org/10.1126/science.aan4880>

Impact: <https://www.altmetric.com/details/29016027> Citations: *INSPIRE-HEP*: 343, *WoS*: 222.

Brief summary: In this article, I studied the gamma-ray emission of two extended sources and computed the expected positron flux at Earth. The conclusion was that, under certain circumstances, these two sources are unable to explain the PAMELA positron excess.

2) "Evidence of 200 TeV Photons from HAWC J1825-134", HAWC Collaboration, *ApJL* 907 L30 (2021). **CA**. DOI: <https://doi.org/10.3847/2041-8213/abd77b>

Impact: <https://www.altmetric.com/details/96905942> Citations: *INSPIRE-HEP*: 42, *WoS*: 25.

Brief summary: In this article, I analyzed the region around HAWC1825 where several sources were detected, one of them showing very-high-energy emission. This source is a potential candidate to be responsible for accelerating cosmic rays up to PeV energies.

3) “A Targeted Search for Point Sources of EeV Neutrons”, Pierre Auger Collaboration, *ApJL* 789 L34 (2014). **CA**. DOI: <https://doi.org/10.1088/2041-8205/789/2/L34> Citations: *INSPIRE-HEP*: 32, *WoS*: 13

Brief summary: In this article, I searched for sources of cosmic neutrons. No significant detection was found, but the obtained limits constrain the emission of neutrons of ultra-high-energy in our Galaxy.

4) “Observation of the Crab Nebula with the HAWC Gamma-Ray Observatory”, HAWC Collaboration, *ApJ*, 843:39 (2017). **Significant contribution** producing the results.

DOI: <https://doi.org/10.3847/1538-4357/aa7555> Citations: *INSPIRE-HEP*: 280, *WoS*: 109

Brief summary: In this publication, the flux of the Crab Nebula, a well-known source in gamma rays, was computed and compared to other experiments. The HAWC performance with real data was computed for the first time.

5) “Multimessenger Astronomy with Neutrinos”, F. Salesa Greus & A. Sánchez Losa, *Universe* 2021, 7(11), 397. **CA**. DOI: <https://doi.org/10.3390/universe7110397>

Citations: *INSPIRE-HEP*: 4, *WoS*: 2

Brief summary: This short review on multimessenger astronomy with neutrinos written per invitation together with another colleague.

6) “Nanobeacon: A time calibration device for the KM3NeT neutrino telescope”, KM3NeT Collaboration. *NIM A* 1040, 167132 (2022) **CA**

DOI: <https://doi.org/10.1016/j.nima.2022.167132>

Brief summary: This is a technical article on the *nanobeacon* system developed at IFIC by the group engineers. This system is based on the ANTARES optical beacons of which I have an extensive knowledge since it was one of the main topics of my PhD work.

7) “KM3NeT Time calibration with Nanobeacons” A. Sánchez Losa, F. Salesa Greus et al. *PoS(ICRC2023)*1062. **Significant contribution** producing the results. DOI: <https://doi.org/10.22323/1.444.1062>

Brief summary: First results in situ from the *nanobeacon* calibration system.

8) “The ANTARES optical beacon system”, ANTARES Collaboration. *NIM A* 578, Issue 3, 498-509 (2007). **Significant contribution** producing the results.

DOI: <https://doi.org/10.1016/j.nima.2007.05.325>

Brief summary: ANTARES optical LED beacon system technical description and first measurements at the ANTARES site.

9) “The Neutrino Mediterranean Observatory Laser Beacon: Design and Qualification”, D. Real, F. Salesa Greus, et al., *Appl. Sci.* 2023, 13(17), 9935; **Significant contribution**

DOI: <https://doi.org/10.3390/app13179935>

Brief summary: This paper outlines the design and qualification process of the NEMO laser beacon, crucial for time calibration in underwater neutrino telescopes.

10) “A Narrow Optical Pulse Emitter Based on LED: NOPELED”, D. Real, F. Salesa Greus, et al. *Sensors* 2022, 22(19), 7683; **Significant contribution**

DOI: <https://doi.org/10.3390/s22197683>

Brief summary: This work introduces NOPELED, a cost-effective and remotely operated light source utilizing LEDs to emit short optical pulses for particle physics experiments.

C.2. Congresses

1) “KM3NeT: Detector Status and Recent Astronomy Results”, F. Salesa Greus, XVI CPAN days, Madrid, November 2024, **Oral presentation**,

Link: <https://indico.ific.uv.es/event/7664/contributions/25395/>

2) “Latest Results and Lessons Learned from the ANTARES Neutrino Telescope”, F. Salesa Greus and the ANTARES Collaboration, XVIII International Conference on Topics in Astroparticle and Underground Physics (TAUP2023), Vienna (Austria), Aug 2023. **Oral**

presentation, Link: <https://indico.cern.ch/event/1199289/contributions/5446960/>

3) “High Energy Multi-messenger Astronomy”, **F. Salesa Greus**, XIII CPAN days, Huelva, March 2022. **Invited talk**, Link: <https://indico.ific.uv.es/event/6457/contributions/17775/>

4) “Spectral and Morphological Studies of the Very High Energy Gamma-Ray Source 2HWC J1825-134”, **F. Salesa Greus**, S. Casanova on behalf of the HAWC Collaboration, *ICRC 2019*, Madison (USA). **Oral presentation**. DOI: <https://doi.org/10.22323/1.358.0781>

5) “Gamma-Ray Astronomy with the HAWC Observatory”, **F. Salesa Greus** and the HAWC Collaboration, *Meeting of the Polish Astronomical Society 2018*, Zielona Góra (Poland). **Invited talk**, Link: <https://www.pta.edu.pl/proc/v7p316>

6) “Constraining the Origin of Local Positrons with HAWC TeV Gamma-Ray Observations of Two Nearby Pulsar Wind Nebulae”, **F. Salesa Greus**, S. Casanova, B. Dingus, R. Lopez-Coto, H. Zhou on behalf of the HAWC Collaboration, *ICRC 2017*, Busan (Korea). **Oral presentation**. DOI: <https://doi.org/10.22323/1.301.0722>

7) “Recent Results from the HAWC Observatory”, **F. Salesa Greus** for the HAWC Collaboration, *11th Workshop on Science with the New generation of High Energy Gamma-ray Experiments*, Pisa (Italy). **Invited talk**. DOI: <https://doi.org/10.1393/ncc/i2017-17114-6>

8) “Observations of the Crab Nebula with Early HAWC Data”, **F. Salesa Greus** for the HAWC Collaboration, *ICRC2015*, The Hague (The Netherlands). **Oral presentation**. DOI: <https://doi.org/10.22323/1.236.0744>

9) “First results from the HAWC Gamma-Ray Observatory”, **F. Salesa Greus** for the HAWC Collaboration, *International Conference on High Energy Physics (ICHEP2014)*, Valencia. **Oral presentation**. DOI: <https://doi.org/10.1016/j.nuclphysbps.2015.09.040>

10) “Searches for Galactic neutron sources with the Pierre Auger Observatory”, **F. Salesa Greus** for the Pierre Auger Collaboration, *ICRC2013*, Rio de Janeiro (Brazil). **Oral presentation**. Link: <https://inspirehep.net/literature/1412445>

C.3. Research projects

Current Projects (only as **Principal Investigator**):

1) “Telescopios de neutrinos como herramienta de exploración de física fundamental y el universo multimensajero en el IFIC” (ref: PID2024-156285NB-C41) funded by AEI – MCIN, **national grant**, 2025-2028.

2) “Towards full implementation of the KM3NeT Research Infrastructure”, HORIZON-INFRA-2021-DEV-02-02 (ref: 101079679), European Commission, 1.5 M€, (CSIC: 225 k€), **European grant**, 2023-2025, <https://cordis.europa.eu/project/id/101079679>

3) “Multi-messenger Astronomy with Gamma-ray and Neutrino Observations”, Consolidación Investigadora 2023 (ref: CNS2023-144099), 200k€, **national grant**, 2024-2026.

Past Projects as (only as **Principal Investigator**):

a) “Contribución del CSIC al proyecto ESFRI KM3NeT 2.0: impulsando la investigación en astrofísica y física fundamental”, Programa CSIC en Grandes Infraestructuras de Investigación Europeas (ref: INFRA23013), 100 k€, **national grant**, 2023-2025, <https://www.csic.es/es/investigacion/proyectos-de-investigacion/contribucion-del-csic-al-proyecto-esfri-km3net-20>

b) “Search for the sources of high-energy cosmic rays with the KM3NeT neutrino telescope in the era of Multi-messenger astronomy”, 364 k€, Plan GenT (Generalitat Valenciana), ref. CIDEAGENT/2018/034, **regional grant** (Spain), 2019-2024, [CIDEAGENT/2018](https://www.cideagent.es/)

c) “Searching for gamma-ray bursts at GeV energies with the HAWC Observatory”, 917k PLN (~200 k€), OPUS 16 (Narodowe Centrum Nauki), ref. 2018/31/B/ST9/01069, **national grant** (Poland), 2019-2022, https://projekty.ncn.gov.pl/index.php?projekt_id=430855

Note: Had to resign from the project after 1 month because it was incompatible with project #a