

CURRICULUM VITAE

Part A. PERSONAL INFORMATION

CV date

16/06/2025

First name	Rosa Pilar		
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A.1. Current position

Position	Postdoctoral Researcher		
Initial date	05/02/2025		
Institution	University of Salamanca (USAL)		
Department/Center	Applied Physics	Faculty of Sciences	
Country	Spain	Teleph. number	677565483
Key words	Concentrated Solar Thermal, Solar Central Tower, Pumped Thermal Energy Storage, Brayton cycles, Heat Transfer		

A.2. Previous positions (research activity interruptions, see call)

Period	Position/Institution/Country/Interruption cause
01/05/2024-04/02/2025	ATTOSTRUCTURA project Postdoctoral Researcher, USAL, Spain
27/04/2023-26/04/2024	Margarita Salas Postdoctoral Researcher, USAL, Spain
27/04/2022-26/04/2023	Margarita Salas Postdoctoral Researcher, University of Cagliari, Italy
27/11/2020-26/04/2022	Período de Orientación Postdoctoral Researcher, USAL, Spain
01/12/2017-26/11/2020	Personal Investigador Predoctoral en Formación USAL, Spain
04/09/2017-30/11/2017	Researcher, General Foundation of USAL, Spain
13/02/2017-30/11/2017	Teacher, Adventia & USAL, Spain
13/02/2017-30/06/2017	Profesor Asociado 3+3h, USAL, Spain
16/09/2015-15/10/2016	Researcher under ENE2013-40644-R project, USAL, Spain
01/04/2016-07/07/2016	Researcher, General Foundation of USAL, Spain

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
PhD in Applied Physics and Technology	University of Salamanca	2020
Master in Physics	University of Salamanca	2016
Degree in Physics	University of Salamanca	2015

Part B. CV SUMMARY

I have published 19 **papers** (and 1 is under review), from which 13 were published in Q1 JCR journals (9 D1) and I am the first author in 8 of them. I have participated in 54 contributions to 38 different relevant international and national **conferences**, from which 48 have been oral contributions and 6 posters. In total, I have presented 14 oral contributions (10 international and 4 national) in conferences like *SolarPACES*, the leader international conference on Concentrated Solar Power (CSP), *ECOS* or *CNIT*, the leader Spanish conference on engineering thermodynamics. I have published 2 book chapters. I have been involved in 6 research **projects** and 5 transfer activities/contracts. I have contributed actively to all of them, highlighting a transfer activity in which I have been the principal investigator and a research project in which I have been the second principal investigator. My predoctoral research (including end of degree project and end of master project) has been mainly focused on CSP plants coupled to different types of Brayton cycles and, during my post-doctoral period, I am continuing this research line and widening it to supercritical CO₂ Brayton cycles coupled to a solar central tower. Besides this, I am working on the simulation and analysis of Pumped Thermal Energy Storage (PTES) systems. Nowadays, I am studying heat transfer processes (and other thermal properties) in solar receivers. For performing those activities and along all this research career, I have developed different kind of specific **software** employing diverse methodologies and languages (Mathematica, Matlab, EES, Python, Fortran). Additionally, I have performed simulations using already developed commercial software like TRNSYS or Thermoflex. I have performed 4 **Research Internships**:

- University of Cagliari (Department of Mechanical, Chemical and Materials Engineering, *Energy systems group*) (Italy, 27/04/2022-26/04/2023): analysing different PTES systems (Brayton and Rankine) and their integration into renewable energies (CSP, PV and wind) framework. As a result: we have published 2 papers together, we are working in other one and we have presented 2 contributions in key conferences for the topic.
- Cranfield University (Centre for Renewable Energy Systems, *Concentrating Solar Power group*) (United Kingdom, 13-28/01/2020): exchanging information about the heliostat fields of CSP plants and their efficiency computation techniques and about the gas turbines coupled to them.
- KTH Royal Institute of Technology (Department of Energy Technology, *Concentrating Solar Power and Techno-Economic Analysis Group*) (Stockholm, Sweden, 11/02-10/05/2019): performing dynamic simulations via *TRNSYS* software and a thermo-economic study of Solar Power Tower plants coupled to hybrid combined cycles with Thermal Energy Storage. As a result: we have published a paper together as a proceeding of a conference.
- *Escuela Técnica Superior de Ingenieros Industriales de Madrid* (ETSII-UPM, *Departamento de Ingeniería Eléctrica, Termodinámica Aplicada a la Ingeniería Industrial* research group) (Madrid, 07-11/11/2016): performing thermodynamic analyses of Solar Power Tower plants via *Thermoflow* software. As a result: we have published recently a paper together related to supercritical CO₂ Brayton cycles, besides to an oral contribution in a conference.

Within my scientific career, the **dissemination** of the research topic to diverse audiences has been considered highly relevant performing 25 different activities: talks, workshops at secondary schools, recording of explanatory videos, exhibitions, mentorship programs, and several newspapers and videos reports. Regarding my **teaching** experience, I have co-taught and collaborated several times in diverse subjects from different Degrees and Master at the USAL, with a total of 400 hours of teaching. I have also worked for *Adventia*, a pilots training company, teaching Physics with a total of 140 hours (USAL Degree, 2017) and Meteorology and Mass and Balance of aircrafts with a total of 175.75 (Pilots Integrated Course, 2017), all in English. I have been involved in 4 Teaching Innovation Projects too. I have codirected 7 End of Degree Projects and 1 End of Master Project at USAL. With respect to my **academic** training, I have attended 40 courses, seminars and workshops, including topics like Thermal Energy Storage, Circular Economy, Climate Change, Statistics for Researchers and International Workshops: "MSLOOP 2.0: key element for the new solar thermal energy plants" (Madrid, 09/07/2019) and "Thermal Storage for Solar Thermal Concentrating Plants" by *IMDEA Energía* (Madrid, 14/09/2016). I also completed the Initial Training of University Teachers (*FIPU*) course at USAL (online, 30/04-30/09/2021). I have obtained a passing grade at the CertAcles English exam level C1 (16/01/2024) and at Italian level B1 (University of Cagliari, 2023). I have obtained **other merits**: winner of the *XI Edición del Premio Alumni – Universidad de Salamanca a la Investigación "Profesor Garmendia"* award at PhD category (2000 €) (29/06/2021), *Premio Extraordinario de Doctorado* (2020), and *Premio Extraordinario de Master* (2016). I received the positive evaluation by *ANECA* for the accreditation as *Profesora Contratada Doctora*, *Profesora Ayudante Doctora* and *Profesora de Universidad Privada* (19/05/2021).

Part C. RELEVANT MERITS

C.1. Publications – a selection of the 10 most relevant publications

- 1 M. Petrollese (CA), M. Marchionni; R.P. Merchán; L. Migliari; G. Cau, 2025, Comparative analysis of different Rankine PTES system configurations, *Journal of Energy Storage*, 114: 115800. <https://doi.org/10.1016/j.est.2025.115800> (3/5) JCR Impact Index (JCRII): 8.9 (Q1).
- 2 M. Cascetta; F. Licheri; R.P. Merchán; M. Petrollese (CA), 2023, Operating performance of a Joule-Brayton pumped thermal energy storage system integrated with a concentrated solar power plant, *Journal of Energy Storage*, 73(B):108865. <https://doi.org/10.1016/j.est.2023.108865> (3/4) JCRII: 8.9 (Q1). Scopus Times Cited (STC): 26.
- 3 J. García-Ferrero; R.P. Merchán (CA); M.J. Santos; A. Medina; A. Calvo Hernández, 2022, Brayton technology for Concentrated Solar Power plants: Comparative analysis of central tower plants and parabolic dish farms, *Energy Conversion and Management*, 271:116312. <https://doi.org/10.1016/j.enconman.2022.116312> (2/5) JCRII: 11.533 (Q1). STC: 15.
- 4 R.P. Merchán; M.J. Santos; A. Medina (CA); A. Calvo Hernández, 2022, High Temperature Central Tower Plants for Concentrated Solar Power: 2021 Overview, *Renewable and Sustainable Energy Reviews*, 155:111828. <https://doi.org/10.1016/j.rser.2021.111828> (1/4) JCRII: 16.799 (Q1). STC: 157.
- 5 R.P. Merchán; M.J. Santos; J. García-Ferrero; A. Medina (CA); A. Calvo Hernández, 2021, Thermo-economic and sensitivity analysis of a central tower hybrid Brayton solar power plant, *Applied*

- Thermal Engineering, 186:116454. <https://doi.org/10.1016/j.applthermaleng.2020.116454> (1/5). JCRII: 6.465 (Q1). STC: 23.
- 6 R.P. Merchán; M.J. Santos; I. Heras; J. González-Ayala; A. Medina (CA); A. Calvo Hernández, 2020, On-design pre-optimization and off-design analysis of hybrid Brayton thermosolar tower power plants for different fluids and plant configurations, Renewable and Sustainable Energy Reviews, 119:109590. <https://doi.org/10.1016/j.rser.2019.109590> (1/6) JCRII: 14.982 (Q1). STC: 21.
- 7 R. P. Merchán; M. J. Santos (CA); A. Medina; A. Calvo Hernández, 2018, Thermodynamic Model of a Hybrid Brayton Thermosolar Plant, Renewable Energy, 128:473-483. <https://doi.org/10.1016/j.renene.2017.05.081> (1/4) JCRII: 5.439 (Q1). STC: 31.
- 8 M. J. Santos; C. Miguel-Barbero; R. P. Merchán; A. Medina (CA); A. Calvo Hernández, 2018, Roads to improve the performance of hybrid thermosolar gas turbine power plants: working fluids and multi-stage configurations, Energy Conversion and Management, 165:578-592. <https://doi.org/10.1016/j.enconman.2018.03.084> (3/5) JCRII: 7.181 (Q1). STC: 25.
- 9 R.P. Merchán; M.J. Santos; I. Reyes-Ramírez; A. Medina (CA); A. Calvo Hernández, 2017, Modeling hybrid solar gas-turbine power plants: Thermodynamic projection of annual performance and emissions, Energy Conversion and Management, 134:314-326. <https://doi.org/10.1016/j.enconman.2016.12.044> (1/5) JCRII: 6.377 (Q1). STC: 26.
- 10 M.J. Santos; R.P. Merchán; A. Medina (CA); A. Calvo Hernández, 2016, Seasonal thermodynamic prediction of the performance of a hybrid solar gas-turbine power plant, Energy Conversion and Management, 115, 89-102. <https://doi.org/10.1016/j.enconman.2016.02.019> (2/4) JCRII: 5.589 (Q1). STC: 62.
- C.2. Congress – a selection of the 10 most relevant congress contributions**
- 1 J. García-Ferrero; R.P. Merchán; M.J. Santos; A. Medina; A. Calvo-Hernández, Solar Parabolic Dishes for the Production of Solar Synthetic Fuels, SolarPACES Conference 2024 (Roma, Italia, 08-11/10/2024, oral presentation).
- 2 J.A. Moctezuma-Hernández; J. García-Ferrero; R.P. Merchán; J.M. M. Roco, Optimización multiobjetivo de una planta híbrida de energía solar concentrada acoplada a un ciclo Brayton de CO₂ supercrítico, XIX Congreso Ibérico y XV Congreso Iberoamericano de Energía Solar (CIES2024) (Évora, Portugal, 19-21/06/2024, oral presentation).
- 3 M. Petrollese; G. Cau; M. Marchionni; M.L. Marroccu; R.P. Merchán, Design, modeling and simulation of an experimental Rankine PTES system, 7th International Seminar on O.R.C. Power Systems (Seville, 04-06/09/2023, oral presentation).
- 4 R.P. Merchán; M. Petrollese; G. Cau, Integration of renewable energy driven systems with a pumped thermal energy storage for providing dispatchable electricity, 36th International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems (Las Palmas de Gran Canaria, 25-30/06/2023, oral presentation).
- 5 R.P. Merchán; J. García-Ferrero; M.J. Santos; A. Medina; A. Calvo-Hernández, Air vs sCO₂ Central Tower Plant Thermodynamic Comparison, “SolarPACES” Conference 2022 (Albuquerque, USA, 27-30/09/2022, poster).
- 6 S. Trevisan; R.P. Merchán; R. Guédez; M.J. Santos; A. Medina; B. Laumert; A. Calvo Hernández, 2020, Techno-economic analysis of a solar hybrid combined cycle power plant integrated with a packed bed storage at gas turbine exhaust, AIP Conference Proceedings 2303:130009 (“SolarPACES” Conference 2019, Daegu, South Korea, 01-04/10/2019, oral presentation). ISBN 978-0-7354-4037-1 <https://doi.org/10.1063/5.0028727>
- 7 R.P. Merchán; A. Medina; M.J. Santos; I. Heras; J.M. M. Roco; A. Calvo-Hernández, Towards a more efficient generation of central tower hybrid thermosolar gas turbine power plants, 2019, AIP Conference Proceedings 2126, 140004 (“SolarPACES” Conference 2018, Casablanca, Morocco, 02-05/10/2018, oral presentation). ISBN 978-0-7354-1866-0 <https://doi.org/10.1063/1.5117652>
- 8 R.P. Merchán; M.J. Santos; A. Medina; A. Calvo, Multistage Configurations for Central Receiver Hybrid Gas-Turbine Thermosolar Plants, 31st International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact on Energy Systems (Guimarães, Portugal, 17-21/06/2018, oral presentation). ISBN 978-972-99596-4-6.
- 9 R.P. Merchán; M.J. Santos; A. Medina; A. Calvo Hernández, 2017, Hybrid Brayton thermosolar systems: thermodynamic prediction of annual efficiencies and emissions. Current Trends in Energy and Sustainability 2017 Edition, Real Sociedad Española de Física (XXXVI Reunión Bienal de la Real Sociedad Española de Física, Santiago de Compostela, 17-21/07/2017, oral presentation), 47-60, ISBN 978-84-0903541-0. Book chapter.

10 M.J. Santos; R.P. Merchán; A. Medina; A. Calvo Hernández, 2015, *Simulación termodinámica de una planta termosolar híbrida tipo Brayton*. Current Trends in Energy and Sustainability 2015 Edition, Real Sociedad Española de Física (XXXV Reunión Bienal de la Real Sociedad Española de Física, Gijón, 13-17/07/2015, oral presentation), 268-285, ISBN 978-84-608-5438-8. Book chapter.

C.3. Research projects

1 PID2023-147201OB-I00. Integración de la dinámica de sistemas packed-bed en almacenamiento energético mediante sistemas de bombas a alta temperatura (PB-Pumps). Funded by Ministerio de Ciencia, Innovación y Universidades, Proyectos de Generación de Conocimiento 2023 Investigación Orientada Tipo B. Principal investigator: Alejandro Medina Domínguez, USAL. 01/09/2024-31/08/2027. 62.500 €. Working team member.

2 ATTOSTRUCTURA. Structured attosecond pulses for ultrafast nanoscience. Funded by H2020-EU.1.1. – EXCELLENT SCIENCE – European Research Council (ERC). Principal investigator: Carlos Hernández García, USAL. 01/03/2020-31/08/2025. 1.425.000 €. Employed postdoctoral researcher (01/05/2024-04/02/2025).

3 18.S016/324MB04. EARN-PORTAL: Empowering Youth Workers Against Radicalization. Funded by the European Commission. 31/12/2022-30/03/2025. 22.200 €.

4 FS/7-2023. Evaluación de sistemas de almacenamiento térmico aplicados a condiciones locales para el aprovechamiento eficiente de fuentes renovables. Funded by Fundación “Memoria de D. Samuel Solórzano Barruso”. Principal investigator: Julián González Ayala, USAL. 08/01/2024-07/01/2025. 1.320 €. Research team member.

5 Energía termosolar eficiente y flexible: hibridación, almacenamiento térmico y bombas de calor. Funded by Programa Propio I, Modalidad A from USAL. Principal investigator: Alejandro Medina Domínguez, USAL. 20/04/2021-31/12/2021. 10000 €. Second Principal Investigator.

6 ENE2013-40644-R. Convertidores Energéticos Eficientes y Fluidos de Trabajo Sostenibles. Funded by Ministerio de Economía y Competitividad. Principal investigator: Antonio Calvo Hernández, USAL. 01/01/2014- 31/12/2016. 56.870 €. Employed predoctoral researcher (16/09/2015-15/10/2016). Collaboration in the modelling and optimizing of hybrid thermosolar Brayton plants.

C.4. Contracts, technological or transfer merits

1 PC_TCUE18-20P_010. Estudio de viabilidad de una planta termosolar de torre central operando con CO₂ supercrítico y almacenamiento térmico. Convocatoria para la realización de Pruebas de Concepto y Protección de Resultados, Plan para la realización de actuaciones de transferencia de Conocimiento contempladas en la prórroga del plan TCUE 2018-2020, Edición 2021, co-funded by Fondo Europeo de Desarrollo Regional (FEDER) and Junta de Castilla y León (JCyL) (Fundación General de la USAL). Principal investigator. 30/04/2021-30/09/2021. 4500 €.

2 LANZADERA_TCUE18-20_010. Planta de concentración termosolar de disco parabólico con ciclo Brayton híbrida para generación distribuida de energía (BraySolDish). Convocatoria Lanzadera Universitaria de proyectos con empresas, Plan para la realización de actuaciones de transferencia de Conocimiento contempladas en el plan TCUE 2018-2020, co-funded by FEDER and JCyL (Fundación General de la USAL). Principal investigator: Irene Heras Pérez, María Jesús Santos Sánchez, USAL. 01/07/2019-31/12/2019. 8.000 €. Research team member.

3 PC-TCUE_18_20_002. Generación limpia y eficiente de energía eléctrica y térmica a pequeña escala: discos parabólicos termosolares híbridos. Convocatoria para la realización de Pruebas de Concepto y Protección de Resultados, Plan para la realización de actuaciones de transferencia de Conocimiento contempladas en el plan TCUE 2018-2020, co-funded by FEDER and JCyL (Fundación General de la USAL). Principal investigator: María Jesús Santos Sánchez, USAL. 19/12/2018-19/12/2019. 10.000 €. Research team member.

4 PC_TCUE1517_F2_013. Optimización termoeconómica de plantas termosolares híbridas regenerativas y multietapa para su desarrollo en Castilla y León. Convocatoria para la realización de Pruebas de Concepto y Protección de Resultados, Plan para la realización de actuaciones de transferencia de Conocimiento contempladas en el plan TCUE 2015-2017 Fase 2, co-funded by FEDER and JCyL (Fundación General de la USAL). Principal investigator: Alejandro Medina Domínguez, USAL. 08/03/2017-30/04/2018. 6.000 €. Employed predoctoral researcher.

5 PC_TCUE15-16_006. Valoración termo y tecno-económica de plantas termosolares híbridas. Convocatoria para la realización de Pruebas de Concepto y Protección de Resultados, Plan para la realización de actuaciones de Transferencia de Conocimiento contempladas en el plan TCUE 2015-2017, co-funded by FEDER and JCyL (Fundación General de la USAL). Principal investigator: Antonio Calvo Hernández, USAL. 01/04/2016-08/07/2016. 9.000 €. Employed predoctoral researcher.