

PERSONAL INFORMATION

CV date	26/08/2025
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First and Family name	María de los Reyes Rodríguez Sánchez		
Researcher numbers	Researcher ID	F-6849-2016	
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Current position

Name of University/Institution	Universidad Carlos III de Madrid		
Department	Thermal and Fluids Engineering		
Address and Country	Avenida de la universidad, 30, 28911, Leganés, Madrid (Spain)		
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Current position	Assistant Professor	From	01/07/2021
Espec. cód. UNESCO	210601, 331004, 332202		
Key words	Solar power tower (SPT)		

Education

PhD/Master/Degree	University	Year
PhD on Mechanical engineering and industrial organization	Universidad Carlos III de Madrid	2012-2015
Master on Thermal and Fluids Engineering	Universidad Carlos III de Madrid	2011-2012
Mechanical Engineering	Universidad Carlos III de Madrid	2005-2010
Master in compulsory secondary education teacher, vocational training and language education	UNED	2016-2018

CV SUMMARY (max. 3500 characters, including spaces)PhD (2012-2015)

Title: On the design of solar external receivers.

Score: Cum Laude

International mention in agreement with the article 15 R.D. 99/2011

Uc3m doctoral extraordinary prize

Research merits*Publications*

- Author of **27 scientific publications** in international journals indexed in **JCR**. 23 of the publications are in journals belonging to Q1 and 4 in Q2. I am first author of 12 of them. The average number of authors per publication is 4, the number of total citations in my works is of 1013 and my index h is **h17** (Scopus base, August 2025).
 - o The article with higher number of cites has 175.
 - o In the last three years the average number of cites per year of my works is 120.
 - o 3 of the publications were developed with collaboration of international researchers of 3 different research centers of recognized prestige.

Research projects

- **Main research in 4 I+D projects** of competitive announcement.
- **Participation in 16 I+D projects** with public and private financial support.
- **Participation in 2 I+D projects with industry.**
- **Funds attraction of 685.000 €**

Patents

- **3 patents** related to solar receivers of solar power tower plants.

PhD thesis directions

- Co-direction of **1 PhD** thesis titled "Thermo-mechanical modelling to evaluate solar receiver damage" defended in July 2021.

Research stays

- **1 pre-doctoral stay** research in CNRS-PROMES of three months (2015).
- **1 post-doctoral stay** research in CNRS-PROMES of three months (2016).

Other merits

- **24 contributions** to national and international **conferences**. 9 of them were published in research journals not indexed in the JCR and 5 of them were published in conference proceedings with ISBN.
- Member of the **research group** "Ingeniería de sistemas energéticos (ISE)" of the University Carlos III de Madrid.
- Reviewer of more than 30 articles considered for publications in 6 different journals indexed in JCR. Being Outstanding reviewer in 2 Elsevier journals.
- 2 research periods, six-year terms, recognized.

Teaching merits

- Teaching a total of **1000 hours of theory** in grade and **420 hours of lab** in the University Carlos III de Madrid, in courses related to the Thermal and Fluids Department as: Thermal Engineering, Heat Transfer or Solar Energy.
- **Responsible for 29 groups** of theory.
- Participation in **5 innovative teaching projects**.
- **Direction of 20 Bachelor and Master Thesis**.
- **Evaluation of 29 Bachelor and Master Thesis**.
- Assistance to **4 formative courses** about active teaching.

Main research lines

My main line of research is solar thermal tower plants. This complex technology, not yet mature, has allowed to carry out a multidisciplinary study, highlighting:

Thermal, hydrodynamic and mechanical analysis of the central receivers.

In this line I have developed several numerical and analytical models to predict the behaviour of solar receivers, establishing design guidelines based on thermal, mechanical and hydrodynamic limitations, as well as on the maximization of energy and exergy efficiency. Related to this line I developed my doctoral thesis, I have published numerous articles and I have participated in national and international congresses. Additionally, I conducted a research stay to experimentally characterize the optical properties of the materials used in these receivers. Currently, and within the framework of several research projects, I am working on new receiver designs to extend its life time, it should be noted that 3 of the designs studied have been patented. Finally, in this topic I have co-directed a doctoral thesis in the study of the life time and optimization of operation of solar receivers.

Main results:

- **Doctoral thesis** "On the design of solar external receivers".
- Author of **17 publications** in JCR journals, being **first author in 8** of them.
- **16 contributions** to national and international congresses.
- Co-inventor of **3 patents**.

- 1 pre-doctoral **research stay**.
- **Main investigator** in **3** competitive research projects and participant in other **3** projects.
- **Co-direction of the doctoral thesis**, "Thermo-mechanical modelling to evaluate solar receiver damage".

Optical study of the heliostat field.

In this line I have worked on the development of analytical models to characterize the heliostat field of solar thermal power plants type tower, optimizing their aiming strategy to reduce structural damage to the receiver without penalizing optical efficiency. In this theme highlights the development of the FluxSPT code (downloadable in <https://ise.uc3m.es/research/solar-energy/fluxspt/>) that allows to obtain the distribution of the heat flux on the receiver of several solar plants for different days, hours and using different aiming strategies, in parallel I participated in the development of a code that unites heliostats and receiver for the design of the 10 MWe tower solar thermal plant of the Beijing Shouhang company. Additionally, I did a postdoctoral stay at the PROMES-CNRS center, where I experimentally characterized the heliostat field of the Themis thermosolar demonstration plant.

Main results:

- Author of **3 publications** in JCR journals, being **first author in 1** of them.
- **3 contributions** to national and international congresses.
- 1 postdoctoral **research stay**.
- **Participant** in 1 competitive **research project**.
- **FluxSPT Code Development**.

Characterization of the power block, inclusion of new subsystems and life cycle analysis (LCA).

In this line, it is worth mentioning the feasibility study of supercritical power cycles in central receiver solar thermal plants, and the study of the inclusion of new subsystems that reduce the LCOE of these plants, such as the combination of solar thermal plants with a cold network distributed through absorption machines and the possibility of installing a potential energy recovery system that takes advantage of the height of the tower to reduce the self-consumption of the plant.

Main results:

- Author of **4 publications** in JCR journals, being **first author in 2** of them.
- **2 contributions** to national and international congresses.
- **Participant** in 1 competitive **research project**.