

Part A. PERSONAL INFORMATION		CV date		15/05/2020
First and Family name	Alejandro Medina			
Social Security, Passport, ID number	07865245g	Age	53	
Researcher numbers	Researcher ID	E-5510-2015		
	Orcid code	0000-0001-9797-4909		

A.1. Current position

Name of University/Institution	University of Salamanca		
Department	Applied Physics		
Address and Country	Faculty of Sciences, 37008, Salamanca, Spain		
Phone number	+34677565486	E-mail	amd385@usal.es
Current position	Professor	From	2012
UNESCO codes	221300, 220510		
Keywords	Thermodynamics; Optimization; Renewable energies; Energetic efficiency; Concentrated Solar Power		

A.2. Education

PhD	University	Year
Physics	University of Salamanca	1993

A.3. JCR articles, h Index, thesis supervised...

- ✓ 68 JCR articles (21 last five years, 15 Q1), 1 book, several book chapters
- ✓ H-index: 19 (Web of Science)
- ✓ PhD Thesis supervised: 2 (2009 and 2012), other one in progress

Part B. CV SUMMARY (max. 3500 characters, including spaces)

PhD in Physics in 1993. My research interests have evolved from quantum statistical mechanics problems (molecular spectroscopy in dense phases) towards problems related to thermodynamic optimization. The latter includes theoretical analysis as well as applied studies: thermodynamic cycles for electric energy generation plants and automotive engines (particularly spark ignition engines). On the whole, this work led to more than 65 international publications in JCR journals, several book chapters, the coordination of a complete book, several invited conferences, and several research stays in international centers (one year in EEUU and some other short stays in European and south-American countries). My H-index to date is 19 and the average citations per article about 14.

I have experience in coordinating interdisciplinary (mainly physicists and engineers) and international research groups. I belong to a recognized research group (*Research Group on Energy Optimization, Thermodynamics, and Statistical Physics*) from University of Salamanca that maintains stable research collaborations with several international groups. I have directed two PhD thesis on problems related with thermodynamic optimization.

I have participated in about 16 research projects and coordinated two of them. Also I have participated in R&D&i contracts with companies of the electric sector. I have collaborated as reviewer for different JCR international journals.

With respect to my experience in institutional responsibilities I was the vice-chair of the Industrial Engineering School, University of Salamanca and Member of the Research Advisory Committee, University of Salamanca, 2013-2015. I have been recognized with the maximum level in the Spanish system of research evaluation (4/4 research steps).

Part C. RELEVANT MERITS

C.1. Publications (including books) (last 5 years)

1. R.P. Merchán, M.J. Santos, I. Heras, J. Gonzalez-Ayala, A. Medina, J.M.M. Roco, and A. Calvo Hernández
On-design pre-optimization and off-design analysis of hybrid Brayton thermosolar tower power plants for different fluids and plant configurations
Renew. Sust. Ener. Rev. 119, 109590 (2020)
ISI Impact: 10.556 (Q1)
2. J. Gonzalez-Ayala, J. Guo, A. Medina, J.M.M. Roco, and A. Calvo Hernández
Energetic Self-Optimization Induced by Stability in Low-Dissipation Heat Engines
Phys. Rev. Lett. 124, 050603 (2020)
ISI Impact: 9.227 (Q1)
3. J. Guo, Y. Wang, J. Gonzalez-Ayala, J.M.M. Roco, A. Medina, and A. Calvo Hernández
Continuous power output criteria and optimum operation strategies of an upgraded thermally regenerative electrochemical cycles system
Ener. Conv. Manage. 180, 544-664 (2019)
ISI Impact: 7.181 (Q1)
4. J. Gonzalez-Ayala, J. Guo, A. Medina, J.M.M. Roco, and A. Calvo Hernández
Optimization induced by stability and the role of limited control near a steady state
Phys. Rev. E, 100, 062128 (2019)
ISI Impact: 2.353 (Q1)
5. J. Guo, H. Yang, J. Gonzalez-Ayala, H. Zhang, J.M.M. Roco, A. Medina, and A. Calvo Hernández
Thermally driven refrigerators: Equivalent low-dissipation three-heat-source model and comparison with experimental and simulated results
Ener. Conv. Manage., 198, 111917 (2019)
ISI Impact: 7.181 (Q1)
6. J. Guo, Y. Wang, J. Gonzalez-Ayala, J.M.M. Roco, A. Medina, and A. Calvo Hernández
Continuous power output criteria and optimum operation strategies of an upgraded thermally regenerative electrochemical cycles system
Ener. Conv. Manage., 180, 654-664 (2019)
ISI Impact: 6.377 (Q1)
7. R. Basurto-Flores, L. Guzmán-Vargas, S. Velasco, A. Medina, and A. Calvo Hernández
On entropy research analysis: cross-disciplinary knowledge transfer
Scientometrics, 117, 123-139 (2018)
ISI Impact: 2.173 (Q2)
8. J. González- Ayala, A. Medina, J.M.M. Roco, and A. Calvo Hernández
Entropy generation and unified optimization of Carnot-like and low-dissipation refrigerators
Phys. Rev. E, 97, 022139 (2018)
ISI Impact: 2.284 (Q1)
9. M.J. Santos, C. Miguel-Barbero, R.P. Merchán, A. Medina, and A. Calvo Hernández
Roads to improve the performance of hybrid thermosolar gas turbine power plants: Working fluids and multi-stage configurations
Ener. Conv. Manage. 165, 578-592 (2018)
ISI Impact 5.59 (Q1)
10. I. Reyes-Ramírez, S.D. Martínez Boggio, P.L. Curto-Risso, A. Medina, A. Calvo Hernández, and L. Guzmán-Vargas
Symbolic analysis of the cycle-to-cycle variability of a gasoline-hydrogen fueled spark engine
Energies, 11, (2018)
ISI Impact: 2.262 (Q2)
11. R.P. Merchán, M.J. Santos, A. Medina, and A. Calvo Hernández
Thermodynamic model of a hybrid Brayton thermosolar plant
Renew. Ener., 128, 473-484 (2018)
ISI Impact: 4.36 (Q1)
12. A. Durante, G. Pena-Vergara, P.L. Curto-Risso, A. Medina, and A. Calvo Hernández

- Thermodynamic simulation of a multi-step externally fired gas turbine powered by biomass*
Ener. Conv. Manage. 140, 182-191 (2017)
ISI Impact: 5.59 (Q1)
13. R.P. Merchán, M.J. Santos, I. Reyes-Ramirez, A. Medina, and A. Calvo Hernández
Modeling hybrid solar gas-turbine power plants: Thermodynamic projection of annual performance and emissions
Ener. Conv. Manage. 134, 314-326 (2017)
ISI Impact: 5.59 (Q1)
14. J. González-Ayala, J.M.M. Roco, A. Medina, and A. Calvo Hernández
Carnot-like heat engines versus low-dissipation models
Entropy, 19, 182 (2017)
ISI Impact: 1.743 (Q2)
15. Martínez-Boggio, S.D.; Curto-Risso, P.L.; Medina, A.; Calvo Hernández, A.
Simulation of cycle-to-cycle variations on spark ignition engines fueled with gasoline-hydrogen blends
Int. J. Hydrogen Ener. 41, 9087-9099 (2016)
ISI Impact: 3.31 (Q2)
16. Santos M.J.; Merchán, R.P.; Medina, A.; Calvo Hernández A.
Seasonal thermodynamic prediction of the performance of a hybrid solar gas-turbine power plant
Ener. Conv. Manage. 115, 89-102 (2016)
ISI Impact: 5.59 (Q1)
17. Calvo Hernández, A.; Medina, A.; Roco, J. M. M.
Time, entropy generation, and optimization in low-dissipation heat devices
New. J. Phys. 17, 075011 (2015)
Impact: 3.67 (Q1)
18. Sánchez-Orgaz, S. ; Pedemonte, M.; Ezzatti, P.; Curto-Risso, P. L.; Medina, A.; Calvo Hernández, A.
Multi-objective optimization of a multi-step solar-driven Brayton plant
Ener. Conv. Manage. 99, 346-358 (2015)
Impact: 3.59 (Q1)
19. Hunicz, J.; Medina, A.; Litak, G.; Curto-Risso, P. L.; Guzmán-Vargas, L.
Effects of Direct Fuel Injection Strategies on Cycle-by-Cycle Variability in a Gasoline Homogeneous Charge Compression Ignition Engine: Sample Entropy Analysis
Entropy 17, 539-559 (2015)
Impact: 1.56 (Q2)
20. Olivenza-León, D.; Medina, A.; Calvo Hernández, A.
Thermodynamic modeling of a hybrid solar gas-turbine power plant
Ener. Conv. Manage. 93, 435-447 (2015)
Impact: 3.59 (Q1)
21. Calvo Hernández, A.; Roco, J. M. M.; Medina, A.; Velasco, S.; Guzmán-Vargas, L.
The maximum power efficiency 1-root tau: Research, education, and bibliometric relevance
Eur. J. Phys. 224 809-821 (2015)
Impact: 1.4 (Q2)

C.2. Research projects and grants (last 6 years)

1. Title: *Low-scale hybrid thermosolar plants for distributed energy generation*

Regional level

Main researchers: Antonio Calvo Hernández

Number of researchers: 7

Financing agency: JCyL (Spain), SA017-P17

Dates: 01/01/2017 - 31/12/2019, 3 years

Budget: 108.380 €

2. Title: *Thermodynamic optimization of energy converters*

National level

Main researcher: Alejandro Medina

Number of researchers: 7

Financing agency: MINECO(Spain), FIS2010-17147

Dates: 01/01/2011 - 31/12/2013, 3 years

Budget: 30.250 €

3. Title: *Efficient energy converters and sustainable working fluids*

National level

Main researchers: Juan Antonio White Sánchez y Antonio Calvo Hernández

Number of researchers: 13

Financing agency: MINECO (Spain), ENE2013-40644-R

Dates: 01/01/2014 - 31/12/2016, 3 years

Budget: 56.870 €

C.3. Contracts (last 6 years)

1. Reference: PC_TCUE1517_F2_013

Title: *Clean and efficient production of electric energy at small scale: hybrid solar parabolic dishes*

Main researcher: María Jesús Santos Sánchez

Financing agency: Junta de Castilla y León, Fundación General Universidad de Salamanca

Period: 01/02/2019 – 01/02/2020

Budget: 10.000 €

2. Reference: PC_TCUE1517_F2_013

Title: *Thermo-economic optimization of recuperative multi-stage hybrid thermosolar plants in Castilla y León*

Main researcher: Alejandro Medina Domínguez

Financing agency: Junta de Castilla y León, Fundación General Universidad de Salamanca

Period: 01/04/2016 – 31/03/2017

Budget: 6.000 €

3. Reference: FPC-TERMOHIBRIDAS

Title: *Thermo and techno-economic assessment of hybrid thermosolar plants*

Main researcher: Antonio Calvo Hernández

Financing agency: Junta de Castilla y León, Fundación General Universidad de Salamanca

Period: 01/04/2016 – 31/07/2016

Budget: 9.000 €

4. Title: *Thermodynamic and simulation study of different working conditions for the Combined Cycle Plant ACECA. Evaluation of the actions that could reduce plant technical minimum*

Main researcher: José Miguel Mateos Roco

Financing agency: Art. 83 LOU. Iberdrola

Period: 01/04/2016 – 31/12/2017

Budget: 77.000 €

C.5, (e. g., Institutional responsibilities, memberships of scientific societies...)

- ✓ Vice-chair of the Industrial Engineering School, University of Salamanca, 2006-2012
- ✓ Member of the Research Advisory Committee, University of Salamanca, 2013-2015
- ✓ Member of the Editorial Committee of the international journals: Applied Computer Science, Mathematical Problems in Engineering
- ✓ Reviewer for the following international journals: Applied Physics, Chemical Physics, Energy Conversion and Management, Energies, International Journal of Energy Research, International Journal of Green Energy, International Journal of Spectroscopy, Journal of Molecular Structure, SAE Journal and others
- ✓ Research steps acknowledged: 4 (maximum achievable); teaching steps acknowledged: 5 (maximum achievable)

Salamanca (Spain), May 15th, 2020

Signed: Prof. A. Medina