

Mario Merino Martínez

Academic positions

- 2018–present **Associate Professor (Profesor titular)**, *Universidad Carlos III de Madrid*, Escuela Politécnica Superior, Departamento de Bioingeniería e Ingeniería Aeroespacial.
- 2013–2018 **Assistant Professor (Profesor visitante)**, *Universidad Carlos III de Madrid*, Escuela Politécnica Superior, Departamento de Bioingeniería e Ingeniería Aeroespacial.
- 2010–2013 **Assistant researcher/teacher (Profesor ayudante)**, *Universidad Politécnica de Madrid*, Escuela Técnica Superior de Ingenieros Aeronáuticos (ETSIA), Departamento de Fundamentos Matemáticos de la Tecnología Aeronáutica.

Education

- 2010–2013 **PhD in Aerospace Engineering**, *Universidad Politécnica de Madrid*.
- Thesis: *Analysis of Magnetic Nozzles For Space Plasma Thrusters*. Awarded Cum Laude and the International PhD Thesis Mention by the Ministry of Education. Thesis advisor: Prof. Eduardo Ahedo.
- 2010–2012 **Postgraduate Master in Aerospace Engineering**, *Universidad Politécnica de Madrid*.
- 2004–2010 **Aerospace Engineering, Major in 'Aerospace Vehicles'**, *Universidad Politécnica de Madrid*, (5-year program, equivalent to BSc + MSc).
- **ERASMUS exchange year** at TU Delft, the Netherlands (academic year 2007/08).
- 2002–2004 **International Baccalaureate**, *I.E.S. Cardenal López de Mendoza*, Burgos, Spain.
- Grade: 41/45 (with Honors).

Academic awards and scholarships

Runner-up award in the Actúa-UPM competition for entrepreneurship and creation of technology-based businesses, for the business plan 'VECMAN, steerable magnetic nozzle', awarded by *Universidad Politécnica de Madrid* (2015).

SENER Foundation special award to best Engineering PhD Thesis, awarded by *SENER Foundation* (2014).

Universidad Politécnica de Madrid Outstanding PhD Thesis award, awarded by *Universidad Politécnica de Madrid* (2014).

Electric Rocket Propulsion Society (ERPS) IEPC 2011 Best Paper Award, to the paper 'On electron inertia and current ambipolarity in Magnetic Nozzle models,' by E. Ahedo and M. Merino, IEPC-2011-050, awarded by *ERPS* (2011).

Second National Award on Outstanding Graduation in Aerospace Engineering, (Segundo Premio Extraordinario Fin de Carrera), awarded by the *Ministry of Education, Spanish Government* (2010).

First Prize in the “VII Pegasus-AIAA European Student Conference”, awarded by the AIAA and PEGASUS association of European Aerospace Universities (2010).

Second Prize in the “IX National Archimedes Contest for Young Researchers”, awarded by the Spanish Government (2010).

Young Aerospace Engineer of the Year Award, awarded by Aerospace Testing and EUCASS (2010).

EPS Best Poster at the ESCAMPIG XX Congress, awarded by the European Physical Society (7/2010).

Competitive scholarships and personal grants:

- 2014 **UC3M mobility grant**, Universidad Carlos III de Madrid, for research internship at UCLA, CA, USA (three months).
- 2012 **PhD scholarship ‘Beca para la Formación de Profesorado Universitario’ (FPU)**, Spanish Ministry of Education, scholarship granted; resigned to it in favor of my contract at Universidad Politécnica de Madrid in the same period.
- 2010 **Scholarship ‘Beca de Colaboración’**, Spanish Ministry of Education, obtained during my last year of Aerospace Engineering studies at Universidad Politécnica de Madrid.
- 2009–2010 **Scholarship ‘Beca de Colaboración’**, Universidad Politécnica de Madrid, involved teaching calculus and linear algebra courses as teaching assistant.
- 2004–2009 **Five consecutive Academic Excellence Grants**, Community of Madrid, obtained during my Aerospace Engineering studies at Universidad Politécnica de Madrid.

Research activity

Research interests: Plasma space propulsion, magnetic nozzles, helicon plasma thrusters, electron-cyclotron resonance thrusters, fluid and kinetic plasma models, expansion of magnetized and unmagnetized plasma plumes, electromagnetic waves in plasmas, numerical methods and analysis, space systems engineering, active space debris removal, nanosatellites, cubesats.

Research groups:

- 2013–present Aerospace Research Group (AERO), aero.uc3m.es.
- 2008–present Plasmas and Space Propulsion Team (EP2), ep2.uc3m.es.

Research internships:

- 2018 **Beihang University, China**, January (2 weeks), Research on improved plasma plume full-PIC boundary conditions for electrons, Prof. H. Tang research group.
- 2017 **Massachusetts Institute of Technology, USA**, June–August (3 months), Theoretical study of plasma waves near the electron cyclotron resonance, at the Plasma Science and Fusion Center, Prof. P. Bonoli research group.
- 2014 **University of California Los Angeles, USA**, June–August (3 months), Experimental plasma physics of cusp confinement for plasma space propulsion, at Prof. R. Wirz research group.

2012 **Stuttgart University, Germany**, *June-August (3 months)*, Experimental investigation of a high-power, applied-field Magneto-plasma-dynamic thruster, at Institute of Space Systems (IRS).

PhD thesis direction:

2016–present **Modeling the plasma discharge in an electron-cyclotron-resonance thruster**, doctorand: Álvaro Sánchez, Universidad Carlos III de Madrid.
Co-direction. Thesis in progress.

2014–2017 **Analysis of the expansion of a plasma thruster plume into vacuum**, doctorand: Filippo Cichocki, Universidad Carlos III de Madrid.
Co-direction. Awarded: *Cum Laude*; Ministry's International Mention; and the UC3M Extraordinary PhD Thesis Award.

2013–2017 **Modeling of physical processes in radio-frequency plasmas**, doctorand: Bin Tian, Universidad Carlos III de Madrid.
Co-direction.

Supervision of incoming visitors and students:

2016–2017 **Min Li**, *Beihang University, China*, 6 month PhD research internship funded by Chinese Government scholarship.

Work: Particle-in-cell analysis of the electron demagnetization process in the far region of propulsive magnetic nozzles, Universidad Carlos III de Madrid.

2016–2017 **Javier Mauriño-Alperovich**, *Imperial College, UK*, 6 month MSc internship.

Work: Kinetic modeling of collisionless electron cooling in electric propulsion plasma plumes, Universidad Carlos III de Madrid.

2015–2016 **Mick Wijnen**, *TU Delft, The Netherlands*, 4 month internship and 6 month MSc thesis under the ERASMUS+ placement Program.

Work: Development of diagnostic system for EP test facility and characterization of a Helicon plasma thruster prototype, Universidad Carlos III de Madrid.

2016 **Aurélien Proux**, *ENSTA-ParisTECH, France*, 3 month MSc internship under the ERASMUS+ placement Program.

Work: Kinetic modeling of expanding plasma plumes into vacuum, Universidad Carlos III de Madrid.

2016 **Saul Rindt**, *TU Eindhoven, The Netherlands*, 3 month MSc internship under the ERASMUS+ placement Program.

Work: ECR plasma heating in space thrusters, Universidad Carlos III de Madrid.

2015 **Simon Peterschmitt**, *ENSTA-ParisTECH, France*, 3 month MSc internship.

Work: Toward a wave-plasma model of the electron-cyclotron resonance (ECR) plasma thruster, Universidad Carlos III de Madrid.

Research Projects and Contracts:

2018–2020 **NanoStar, Collaborative network for the development of educational nanosatellites in Europe**, supported by the EU Interreg-SUDOE VB Program (European Commission), Grant number: SOE2/P1/F0684, (310.5 k€).

Principal Investigator: Mario Merino.

Project Manager: Aersospace Valley (France).

2017–2020 **MINOTOR, Magnetic NOzzle thruster with elecTRon cyclOTron Resonance**, supported by the H2020 Program (European Commission), Grant number: 730028, (310 k€).

Principal Investigator: Mario Merino.

Project Manager: ONERA (France).

- 2017–2019 **PE3, Propulsores Electromagnéticos para la Exploración Espacial**, supported by the Ministry of Economy and Competitiveness, National I+D plan, Spanish Government, Grant number: ESP2016-75887-P, (228.4 k€).
Principal Investigators: Eduardo Ahedo, Pablo Fajardo.
- 2017 **Experimental campaign for the characterization and optimization of the HPT-05M Helicon Plasma Thruster prototype**, supported by SENER Ingeniería y Sistemas, (15 k€).
Principal Investigator: Jaime Navarro.
- 2016–2020 **CHEOPS, Consortium for Hall Effect Orbital Propulsion System**, supported by the H2020 Program (European Commission), Grant number: 730135, (360 k€).
Principal Investigator: Eduardo Ahedo.
Project Manager: SAFRAN-Snecma (France).
- 2016–2019 **Development of an advanced axisymmetric model of the full plasma discharge in the Helicon Plasma Thruster**, supported by Airbus Defence and Space (France), (90 k€).
Principal Investigator: Eduardo Ahedo.
- 2016–2018 **Technological prospective in the aerospace field**, supported by ISDEFE S.A., (specific framework contract), (80 k€).
Principal Investigator: Pablo Fajardo.
- 2016–2018 **MODEX: Model and experimental validation of spacecraft thruster interactions for electric propulsion thrusters plume**, supported by ESA, Contract number: 4000116180/15/NL/PS, (80 k€).
Principal Investigator: Eduardo Ahedo.
Project Manager: Airbus Defense and Space (France).
- 2016–2017 **Characterisation tests on Helicon Plasma Thruster**, supported by Airbus Defence and Space (France), (15 k€).
Principal Investigator: Pablo Fajardo.
- 2016 **Experimental campaign for the characterization and optimization of the HPT-05 Helicon Plasma Thruster prototype**, supported by SENER Ingeniería y Sistemas, (13.5 k€).
Principal Investigator: Pablo Fajardo.
- 2015–2016 **Design and manufacturing of a RFCLP Langmuir Probe for the use in RF Generated Plasmas**, supported by ESA, Contract number: 5001017118, (12.5 k€).
Principal Investigator: Mario Merino.
Project Manager: SENER Ingeniería y Sistemas.
- 2013–2015 **Cámara de Ensayo de Propulsión Eléctrica**, supported by the Ministry of Economy and Competitiveness, National program for scientific infrastructure and equipment, Spanish Government, Grant number: UNC313-4E-1552, (547.5 k€).
Principal Investigators: Eduardo Ahedo, Pablo Fajardo.
- 2013–2016 **Propulsión Espacial por Plasma: Simulación y Experimentación**, supported by the Ministry of Economy and Competitiveness, National I+D plan, Spanish Government, Grant number: ESP2013-41052-P, (242 k€).
Principal Investigators: Eduardo Ahedo, Pablo Fajardo.
- 2013–2016 **LEOSWEEP, improving Low Earth Orbit Security With Enhanced Electric Propulsion**, supported by the European 7th Framework Program (European Commission), Grant number: 607457, (165 k€).
Principal Investigator: Eduardo Ahedo.
Project Manager: SENER Ingeniería y Sistemas.

- 2013–2015 **HPT, Helicon Plasma Thrusters for Space Missions**, supported by ESA, Contract number: 4000107292/12/NL/CO, (63.5 k€).
Principal Investigator: Eduardo Ahedo.
Project Manager: SENER Ingeniería y Sistemas.
After the conclusion of the project, activity was continued within a joint venture with SENER for the development, construction and testing of the **HPT05 Helicon Plasma Thruster prototype**.
- 2013–2014 **IBSIOD, Ion Beam Shepherd In-Orbit Demonstrator**, supported by ESA, Contract number: 4000109292/13/NL/MV, (8 k€).
Principal Investigator: Eduardo Ahedo.
Project Manager: DEIMOS SPACE.
- 2012–2013 **Plasma detachment mechanisms in propulsive magnetic nozzles**, supported by the EOARD, USAF, Contract number: FA8655-12-1-2043, (30 k€).
Principal Investigator: Eduardo Ahedo.
- 2010–2011 **Magnetic nozzles for plasma thrusters: acceleration, thrust, and detachment mechanisms**, supported by the EOARD, USAF, Contract number: FA8655-10-1-3085, (25 k€).
Principal Investigator: Eduardo Ahedo.
- 2010–2011 **Ion Beam Shepherd for Contactless Debris Removal**, supported by ESA, Contract number: 4000101447/10/NL/CBi, (12.5 k€).
Principal Investigator: Claudio Bombardelli.
- 2010–2013 **Propulsión Espacial por Plasma**, supported by the Ministry of Economy and Competitiveness, National I+D plan, Spanish Government, Grant number: AYA2010-16699, (70 k€).
Principal Investigator: Eduardo Ahedo.
- 2008–2010 **HPH.com, Helicon Plasma Hydrazine COmbined Micro**, supported by the European 7th Framework Program (European Commission), Grant number: 218862, (95 k€).
Principal Investigator: Eduardo Ahedo.
Project Manager: Università degli Studi di Padova (Italy).

Publications in Peer-Reviewed Journals and Books

- 1 Ahedo, E. and Merino, M., "Two-dimensional supersonic plasma acceleration in a magnetic nozzle," *Physics of Plasmas*, Vol. 17, No. 7, 2010, pp. 073501.
- 2 Ahedo, E. and Merino, M., "On plasma detachment in propulsive magnetic nozzles," *Physics of Plasmas*, Vol. 18, No. 5, 2011, pp. 053504.
- 3 Merino, M. and Ahedo, E., "Simulation of plasma flows in divergent magnetic nozzles," *IEEE Transactions on Plasma Science*, Vol. 39, No. 11, 2011, pp. 2938–2939.
- 4 Ahedo, E. and Merino, M., "Two-dimensional plasma expansion in a magnetic nozzle: separation due to electron inertia," *Physics of Plasmas*, Vol. 19, No. 8, 2012, pp. 083501.
- 5 Bombardelli, C., Urrutxua, H., Merino, M., Ahedo, E., and Peláez, J., "Relative Dynamics and Control of an Ion Beam Shepherd Satellite," *Spaceflight mechanics 2012*, edited by J. V. McAdams, D. P. McKinley, M. M. Berry, and K. L. Jenkins, Vol. 143 of *Advances in the Astronautical Sciences*, Univelt, 2012, pp. 2145–2158.
- 6 Bombardelli, C., Urrutxua, H., Merino, M., Peláez, J., and Ahedo, E., "The ion beam shepherd: A new concept for asteroid deflection," *Acta Astronautica*, Vol. 90, No. 1, 2013, pp. 98–102.

- 7 Merino, M. and Ahedo, E., "Two-dimensional quasi-double-layers in two-electron-temperature, current-free plasmas," *Physics of Plasmas*, Vol. 20, No. 2, 2013, pp. 023502.
- 8 Merino, M., Ahedo, E., Bombardelli, C., Urrutxua, H., and Peláez, J., "Ion Beam Shepherd satellite for Space Debris Removal," *Progress in Propulsion Physics*, edited by L. T. DeLuca, C. Bonnal, O. J. Haidn, and S. M. Frolov, Vol. IV of *EUCASS Advances in Aerospace Sciences*, chap. 8, Torus Press, 2013, pp. 789–802.
- 9 Merino, M. and Ahedo, E., "Plasma detachment in a propulsive magnetic nozzle via ion demagnetization," *Plasma Sources Science and Technology*, Vol. 23, No. 3, 2014, pp. 032001.
- 10 Merino, M. and Ahedo, E., "Influence of Electron and Ion Thermodynamics on the Magnetic Nozzle Plasma Expansion," *IEEE Transactions on Plasma Science*, Vol. 43, No. 1, Jan 2015, pp. 244–251.
- 11 Merino, M., Cichocki, F., and Ahedo, E., "Collisionless Plasma thruster plume expansion model," *Plasma Sources Science and Technology*, Vol. 24, No. 3, 2015, pp. 035006.
- 12 Alpatov, A., Cichocki, F., Fokov, A., Khoroshylov, S., Merino, M., and Zakrzhevskii, A., "Determination of the force transmitted by an ion thruster plasma plume to an orbital object," *Acta Astronautica*, Vol. 119, 2016, pp. 241–251.
- 13 Merino, M. and Ahedo, E., "Fully magnetized plasma flow in a magnetic nozzle," *Physics of Plasmas*, Vol. 23, No. 2, 2016, pp. 023506.
- 14 Merino, M. and Ahedo, E., "Effect of the plasma-induced magnetic field on a magnetic nozzle," *Plasma Sources Science and Technology*, Vol. 25, No. 4, 2016, pp. 045012.
- 15 Merino, M. and Ahedo, E., "Magnetic Nozzles for Space Plasma Thrusters," *Encyclopedia of Plasma Technology*, edited by J. L. Shohet, Vol. 2, Taylor and Francis, 2016, pp. 1329–1351.
- 16 Cichocki, F., Merino, M., Ahedo, E., Smirnova, M., Mingo, A., and Dobkevicius, M., "Electric Propulsion Subsystem Optimization for "Ion Beam Shepherd" Missions," *Journal of Propulsion and Power*, Vol. 33, No. 2, 2017, pp. 370–378.
- 17 Merino, M. and Ahedo, E., "Contactless steering of a plasma jet with a 3D magnetic nozzle," *Plasma Sources Science and Technology*, Vol. 26, No. 9, 2017, pp. 095001.
- 18 Cichocki, F., Domínguez-Vázquez, A., Merino, M., and Ahedo, E., "Hybrid 3D model for the interaction of plasma thruster plumes with nearby objects," *Plasma Sources Science and Technology*, Vol. 26, No. 12, 2017, pp. 125008.
- 19 Giono, G., Gudmundsson, J., Ivchenko, N., Mazouffre, S., Dannenmayer, K., Popelier, L., Loubere, D., Merino, M., and Olentsenko, G., "Non-Maxwellian Electron Energy Probability Functions in the plume of a SPT-100 Hall thruster," *Plasma Sources Science and Technology*, Vol. 27, No. 1, 2018, pp. 015006.
- 20 Cichocki, F., Merino, M., and Ahedo, E., "Spacecraft-plasma-debris interaction in an ion beam shepherd mission," *Acta Astronautica*, Vol. 146, 2018, pp. 216–227.
- 21 Merino, M., Mauriño, J., and Ahedo, E., "Kinetic electron model for plasma thruster plumes," *Plasma Sources Science and Technology*, Vol. 27, No. 3, 2018, pp. 035013.

- 22 Ramos, J., Merino, M., and Ahedo, E., "Three dimensional fluid-kinetic model of a magnetically guided plasma jet," *Physics of Plasmas*, Vol. 25, No. 6, 2018, pp. 061206.
- 23 Domínguez-Vázquez, A., Cichocki, F., Merino, M., Fajardo, P., and Ahedo, E., "Axisymmetric plasma plume characterization with 2D and 3D particle codes," *Plasma Sources Science and Technology*, Vol. 27, No. 10, 2018, pp. 104009.
- 24 Tian, B., Merino, M., and Ahedo, E., "Two-dimensional plasma-wave interaction in an helicon plasma thruster with magnetic nozzle," *Plasma Sources Science and Technology*, Vol. (accepted for publication), 2018.
- 25 Li, M., Merino, M., Ahedo, E., and Tang, H., "On the electron boundary conditions in full PIC simulations of plasma thruster plumes," *Plasma Sources Science and Technology*, Vol. (submitted for publication), 2018.
- 26 Correyero, S., Jarrige, J., Packan, D., Merino, M., and Ahedo, E., "Diamagnetic loop measurements for electrodeless magnetic nozzle plasma thrusters," *Plasma Sources Science and Technology*, Vol. (submitted for publication), 2018.

Patents

- 1 Merino, M. and Ahedo, E., "Sistema sin partes móviles ni electrodos y procedimiento para vectorizar el empuje en motores espaciales de plasma," 2013, Spanish Patent Office, Patent no. P201331790.
- 2 Merino, M., "Motor espacial de plasma sin electrodos con geometría en U," 2018, Spanish Patent Office, Patent no. P201830521 (under evaluation).

Open-source code

All my open-source codes can be obtained on GitHub (<http://github.com>).

- 1 Mario Merino. FUMAGNO code: Fully-magnetized magnetic nozzle simulator, 2017. doi:10.5281/zenodo.593787.
- 2 Mario Merino and Javier Mauriño. AKILES code: Advanced Kinetic Iterative pLasma Expansion Solver 2D, 2017. doi:10.5281/zenodo.1098432.
- 3 Mario Merino and Javier Mauriño. DIMAGNO code: Divergent Magnetic Nozzle plasma flow solver, 2017. doi:10.5281/zenodo.1257295.

Publications in Conference Proceedings

- 1 Ahedo, E. and Merino, M., "Two-dimensional plasma acceleration in a divergent magnetic nozzle," *45th AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit*, No. AIAA 2009-5361, AIAA, Washington DC, 2009.
- 2 Ahedo, E. and Merino, M., "Acceleration of a focused plasma jet in a divergent magnetic nozzle," *31st International Electric Propulsion Conference*, No. IEPC-2009-002, Electric Rocket Propulsion Society, Fairview Park, OH, Fairview Park, OH, 2009.
- 3 Merino, M. and Ahedo, E., "Two-dimensional magnetic nozzle acceleration of a two-electron component plasma," *Space Propulsion Conference 2010*, Association Aéronautique et Astronautique de France, Paris, France, San Sebastian, Spain, 2010.

- 4 Ahedo, E. and Merino, M., "Preliminary assessment of detachment in a plasma thruster magnetic nozzle," *46th AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit*, No. AIAA 2010-6613, American Institute of Aeronautics and Astronautics, Reston, VA, Nashville, TN, 2010.
- 5 Bombardelli, C., Urrutxua, H., Merino, M., Ahedo, E., Peláez, J., and Olympio, J., "Dynamics of Ion-beam-propelled space debris," *22nd International Symposium on Space Flight Dynamics*, 2011.
- 6 Merino, M. and Ahedo, E., "Plasma detachment mechanisms in a magnetic nozzle," *47th AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit*, No. AIAA-2011-5999, AIAA, San Diego, CA, 2011.
- 7 Merino, M., Ahedo, E., Bombardelli, C., Urrutxua, H., Peláez, J., and Summerer, L., "Space Debris Removal with an Ion Beam Shepherd Satellite: target-plasma interaction," *47th AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit*, No. AIAA-2011-6142, American Institute of Aeronautics and Astronautics, Reston, VA, San Diego, CA, 2011.
- 8 Merino, M., Ahedo, E., Bombardelli, C., Urrutxua, H., and Peláez, J., "Hypersonic Plasma Plume Expansion in Space," *32nd International Electric Propulsion Conference*, No. IEPC-2011-086, Electric Rocket Propulsion Society, Fairview Park, OH, Kurhaus, Wiesbaden, Germany, 2011.
- 9 Ahedo, E. and Merino, M., "On electron inertia and current ambipolarity in magnetic nozzle models," *32nd International Electric Propulsion Conference*, No. IEPC-2011-050, Electric Rocket Propulsion Society, Fairview Park, OH, Kurhaus, Wiesbaden, Germany, 2011.
- 10 Merino, M., Ahedo, E., Bombardelli, C., Urrutxua, H., and Peláez, J., "Ion Beam Shepherd Satellite for Space Debris Removal," *4th European Conference for Aerospace Sciences*, EUCASS, 2011.
- 11 Merino, M., "2D plasma flow in a magnetic nozzle with a bi-modal Electron Energy Distribution Function," *50th AIAA Aerospace Sciences Meeting*, No. AIAA 2012-0139, American Institute of Aeronautics and Astronautics, Reston, VA, Washington DC, 2012.
- 12 Merino, M. and Ahedo, E., "Magnetic Nozzle Far-Field Simulation," *48th AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit*, No. AIAA-2012-3843, AIAA, Washington DC, 2012.
- 13 Navarro-Cavallé, J., Merino, M., and Ahedo, E., "Two-Fluid and PIC-Fluid Code Comparison of the Plasma Plume in a Magnetic Nozzle," *48th AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit*, No. AIAA-2012-3840, American Institute of Aeronautics and Astronautics, Reston, VA, Washington DC, 2012.
- 14 Navarro-Cavallé, J., Merino, M., and Ahedo, E., "A fluid dynamic performance model of a helicon thruster," *48th AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit*, No. AIAA-2012-3955, AIAA, Washington DC, 2012.
- 15 Dannenmayer, K., Mazouffre, S., Merino, M., and Ahedo, E., "Hall Effect Thruster Plasma Plume Characterization with Probe Measurements and Self-Similar Fluid Models," *48th AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit*, No. AIAA-2012-4117, American Institute of Aeronautics and Astronautics, Reston, VA, Washington DC, 2012.

- 16 Boxberger, A., Bambach, P., Herdrich, G., Fasoulas, S., Merino, M., and Ahedo, E., "Experimental Investigation of Applied-Field Magnetoplasmadynamic Thrusters at Institute of Space Systems," *48th AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit*, No. AIAA-2012-4012, American Institute of Aeronautics and Astronautics, Reston, VA, Washington DC, 2012.
- 17 Merino, M. and Ahedo, E., "Influence of Electron and Ion Thermodynamics on the Magnetic Nozzle Plasma Expansion," *33rd International Electric Propulsion Conference*, No. IEPC-2013-247, Electric Rocket Propulsion Society, Fairview Park, OH, Washington DC, 2013.
- 18 Navarro-Cavallé, J., Ahedo, E., Merino, M., Gómez, V., and Ruiz, M., "Helicon Plasma Thrusters: prototypes and advances on modeling," *33rd International Electric Propulsion Conference*, No. IEPC-2013-285, Electric Rocket Propulsion Society, Fairview Park, OH, Washington DC, 2013.
- 19 Navarro-Cavallé, J., Ahedo, E., Merino, M., Urdampilleta, I., Ruiz, M., and del Amo, J. G., "Assessment of helicon plasma thruster technology for space missions," *Space Propulsion Conference 2014*, Association Aéronautique et Astronautique de France, Paris, France, 2014.
- 20 Ruiz, M., Urdampilleta, I., Bombardelli, C., Ahedo, E., Merino, M., and Cichocki, F., "The FP7 LEOSWEEP project: Improving low earth orbit security with enhanced electric propulsion," *Space Propulsion Conference 2014*, No. 2980908, Association Aéronautique et Astronautique de France, Paris, France, Cologne, Germany, 2014.
- 21 Merino, M., Cichocki, F., and Ahedo, E., "Plasma Thruster Beam Expansion and Impingement in Space Debris," *13th Spacecraft Charging Technology Conference*, No. 253, Jet Propulsion Laboratory, NASA, 2014.
- 22 Navarro-Cavallé, J., Merino, M., Ahedo, E., Ruiz, M., and Sánchez, V., "Design of Helicon Plasma Thruster subsystems," *50th AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit*, No. AIAA-2014-3699, American Institute of Aeronautics and Astronautics, Reston, VA, Washington DC, 2014.
- 23 Cichocki, F., Merino, M., and Ahedo, E., "Modeling and simulation of EP Plasma Plume Expansion into Vacuum," *50th AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit*, No. AIAA-2014-3828, American Institute of Aeronautics and Astronautics, Reston, VA, Washington DC, 2014.
- 24 Cichocki, F., Merino, M., Ahedo, E., Feili, D., and Ruiz, M., "Electric Propulsion Subsystem Optimization for "Ion Beam Shepherd" missions," *34th International Electric Propulsion Conference*, No. IEPC-2015-420, Electric Rocket Propulsion Society, Fairview Park, OH, Hyogo-Kobe, Japan, July 6-10, 2015.
- 25 Cichocki, F., Ahedo, M. M., and Wang, J., "Fluid vs PIC Modeling of a Plasma Plume Expansion," *34th International Electric Propulsion Conference*, No. IEPC-2015-35, Electric Rocket Propulsion Society, Fairview Park, OH, Hyogo-Kobe, Japan, July 6-10, 2015.
- 26 Feili, D., Ruiz, M., Ahedo, E., Merino, M., Smirnova, M., and Dobkevicius, M., "Impulse Transfer Thruster for an Ion Beam Shepherd Mission," *34th International Electric Propulsion Conference*, No. IEPC-2015-382, Electric Rocket Propulsion Society, Fairview Park, OH, Hyogo-Kobe, Japan, July 6-10, 2015.

- 27 Merino, M., Navarro-Cavallé, J., Casado, S., Gómez, E. A., Ruiz, M., Bosch, E., and Amo, J. G. D., "Design and development of a 1 kW-class helicon antenna thruster," *34th International Electric Propulsion Conference*, No. IEPC-2015-297, Electric Rocket Propulsion Society, Fairview Park, OH, Hyogo-Kobe, Japan, July 6-10, 2015.
- 28 Merino, M. and Ahedo, E., "Towards thrust vector control with a 3D steerable magnetic nozzle," *34th International Electric Propulsion Conference*, No. IEPC-2015-414, Electric Rocket Propulsion Society, Fairview Park, OH, Hyogo-Kobe, Japan, July 6-10, 2015.
- 29 Merino, M. and Ahedo, E., "Modelling the expansion of magnetized plasma jets in electric propulsion," *32nd International Conference on Plasmas and Ionized Gases*, No. TL19, European Physical Society, Mulhouse, France, Iasi, Romania, 2015.
- 30 Merino, M., Navarro-Cavallé, J., Ahedo, E., Gómez, V., Sánchez, V., Ruiz, M., Dannenmayer, K., Bosch, E., and González, J., "Maiden tests of the HPT05 Helicon plasma thruster prototype," *Space Propulsion Conference 2016*, Association Aéronautique et Astronautique de France, Paris, France, Rome, Italy, 2016, p. 3125014.
- 31 Cichocki, F., Rafalskyi, D., Aanesland, A., and Merino, M., "The plume neutralization process of the Pegases thruster," *Space Propulsion Conference 2016*, No. 3124967, Association Aéronautique et Astronautique de France, Paris, France, Rome, Italy, 2016.
- 32 Cichocki, F., Domínguez-Vázquez, A., and Ahedo, E., "A 3D hybrid code to study electric thruster plumes," *Space Propulsion Conference 2016*, Association Aéronautique et Astronautique de France, Paris, France, Rome, Italy, 2016, p. 3124968.
- 33 Smirnova, M., Mingo, A., Kazakov, E., Feili, D., Dobkevicius, M., Ruiz, M., Tejerina, P., Bombardelli, C., Merino, M., Cichocki, F., and Ahedo, E., "Ion Beam Shepherd Mission LEOSWEEP: mission design to ion beam thruster testing," *Space Propulsion Conference 2016*, No. 3125249, Association Aéronautique et Astronautique de France, Paris, France, Rome, Italy, 2016.
- 34 Ahedo, E. and Merino, M., "Physics of Magnetic Nozzles for plasma thrusters," *VKI Lecture Series: Electric Propulsion Systems: from recent research developments to industrial space applications*, No. STO-AVT-263, Von Karman Institute, Von Karman Institute, Belgium, 2016.
- 35 Tian, B., Ahedo, E., and Merino, M., "Development and Validation of a 2D wave-plasma code for helicon plasma thrusters," *Space Propulsion Conference 2016*, Association Aéronautique et Astronautique de France, Paris, France, Rome, Italy, 2016, p. 3124913.
- 36 Merino, M., Proux, A., Fajardo, P., and Ahedo, E., "Collisionless electron cooling in unmagnetized plasma thruster plumes," *52nd AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit*, No. AIAA 2016-5037, AIAA, Salt Lake City, UT, 2016.
- 37 Packan, D., Elias, P.-Q., Jarrige, J., Merino, M., Álvaro Sánchez-Villar, Ahedo, E., Peyresoubes, G., Holste, K., Klar, P., Bekemans, M., Scalais, T., Bourguignon, E., Zurbach, S., Mares, M., Hooque, A., and Favier, P., "The MINOTOR H2020 project for ECR thruster development," *35th International Electric Propulsion Conference*, No. IEPC-2017-547, Electric Rocket Propulsion Society, Fairview Park, OH, Fairview Park, OH, 2017.
- 38 Navarro-Cavallé, J., Wijnen, M., Fajardo, P., Merino, M., and Ahedo, E., "Experimental performances of a 1 kW HPT by means of plasma diagnostics," *35th International Electric*

- Propulsion Conference*, No. IEPC-2017-447, Electric Rocket Propulsion Society, Fairview Park, OH, Atlanta, GA, 2017.
- 39 Domínguez-Vázquez, A., Cichocki, F., Merino, M., Fajardo, P., and Ahedo, E., "2D and 3D Hybrid PIC/Fluid Modelling of Electric Thruster Plumes," *35th International Electric Propulsion Conference*, No. IEPC-2017-209, Electric Rocket Propulsion Society, Fairview Park, OH, Atlanta, GA, 2017.
 - 40 Giono, G., Mazouffre, S., Loubere, D., Popelier, L., Théroude, C., Dannenmayer, K., Marguet, F., Gudmundsson, J., Ivchenko, N., Olentsenko, G., and Merino, M., "Experimental Determination of the Plasma Properties in the Far-plume of an SPT-100 Hall Thruster," *35th International Electric Propulsion Conference*, No. IEPC-2017-385, Electric Rocket Propulsion Society, Fairview Park, OH, Atlanta, GA, 2017.
 - 41 Popelier, L., Théroude, C., Loubère, D., Dannenmayer, K., Sarrailh, P., Hess, S., Merino, M., Fajardo, P., Ahedo, E., Mazouffre, S., Giono, G., Gudmundsson, J., and Ivchenko, N., "Model and Experimental validation of spacecraft-thruster Interactions for electric propulsion thrusters plumes," *35th International Electric Propulsion Conference*, No. IEPC-2017-357, Electric Rocket Propulsion Society, Fairview Park, OH, Atlanta, GA, 2017.
 - 42 Kahnfeld, D., Schneider, R., Cichocki, F., Merino, M., Ahedo, E., Duras, J., and Koch, N., "Comparison of plume simulations of a 2D3V-PIC-MCC and a 3D Hybrid-PIC code," *35th International Electric Propulsion Conference*, No. IEPC-2017-329, Electric Rocket Propulsion Society, Fairview Park, OH, Atlanta, GA, 2017.
 - 43 Li, M., Merino, M., Ahedo, E., Tang, H., and Kitaeva, A., "Full-PIC Code Validation and Comparison against Fluid Models on Plasma Plume Expansion," *35th International Electric Propulsion Conference*, No. IEPC-2017-230, Electric Rocket Propulsion Society, Fairview Park, OH, Atlanta, GA, 2017.
 - 44 Merino, M., Mauriño, J., and Ahedo, E., "Direct-Vlasov Study of Electron Cooling Mechanisms in Paraxial, Unmagnetized Plasma Thruster Plumes," *35th International Electric Propulsion Conference*, No. IEPC-2017-104, Electric Rocket Propulsion Society, Fairview Park, OH, Atlanta, GA, 2017.
 - 45 Merino, M., Álvaro Sánchez-Villar, Ahedo, E., Bonoli, P., Lee, J., Ram, A., and Wright, J., "Wave Propagation and Absorption in ECR Plasma Thrusters," *35th International Electric Propulsion Conference*, No. IEPC-2017-105, Electric Rocket Propulsion Society, Fairview Park, OH, Atlanta, GA, 2017.
 - 46 Sanjurjo-Rivo, M., Merino, M., Cichocki, F., Chen, X., Morante, D., Pérez-Grande, D., Sánchez-Arriaga, G., Soler, M., and Ahedo, E., "The Conquest of Space: un curso MOOC y SPOC en ingeniería aeroespacial," *European MOOCs Stakeholders Summit*, Leganés, Spain, 2017.
 - 47 Sanjurjo-Rivo, M., Merino, M., Cichocki, F., Pérez-Grande, D., Morante, D., Sánchez-Arriaga, G., Soler, M., Chen, X., and Ahedo, E., "The Conquest of Space: a MOOC and a SPOC for engaging students in STEM careers," *International Conference for Educational Media*, Naples, Italy, 2017.
 - 48 Merino, M., García-Souto, J. A., Pradels, G., Daveran, F., Ghiotto, A., Kerherve, E., Escudier, B., Gateau, T., Roche, N., Bernard, M., Dusseau, L., Fontán, E., Alonso, G., Guerman, A., Charrua-Santos, F., and da Costa Campos, L. B., "NanoStar University Network:

Hands-on higher Aerospace Education through Nanosatellite Student Challenges," *2nd Symposium on Space Educational Activities*, Association Aéronautique et Astronautique de France, Paris, France, Budapest, Hungary, 2018.

- 49 Cichocki, F., Merino, M., and Ahedo, E., "A 3D electron fluid model to study magnetic field effects on an expanding plasma thruster plume," *Space Propulsion Conference 2018*, No. 00295, Association Aéronautique et Astronautique de France, Paris, France, Seville, Spain, May 14-18, 2018.
- 50 Álvaro Sánchez-Villar and Merino, M., "Advances in Wave-Plasma Modelling in ECR Thrusters," *Space Propulsion Conference 2018*, No. 00346, Association Aéronautique et Astronautique de France, Paris, France, Seville, Spain, 2018.
- 51 Merino, M., Mauriño, J., and Ahedo, E., "Kinetic electron response in a rarefied plasma jet expanding into vacuum (invited talk)," *24th Europhysics Conference on Atomic and Molecular Physics of Ionized Gases*, European Physical Society, Mulhouse, France, Glasgow, UK, 2018.

Other Presentations in Conferences

- 1 Merino, M. and Ahedo, E., "2D plasma flow in Magnetic Nozzles for Propulsion and Processing applications," *20th European Conference on the Atomic and Molecular Physics of Ionized Gases*, Belgrade Institute of Physics, Belgrade, Serbia, 2010.
- 2 Merino, M. and Ahedo, E., "Detachment mechanisms in a magnetic nozzle for plasma propulsion," *63rd Gaseous Electronics Conference and 7th International Conference on Reactive Plasmas*, No. DTP-085, 2010.
- 3 Merino, M., Martínez, I., Navarro-Cavallé, J., and Ahedo, E., "Toberas Magnéticas: un elemento propulsor de futuros motores de plasma," *5th Spanish Space Student Congress*, Laboratorio para Experimentación en Espacio y Microgravedad, Madrid, Spain, 2010.
- 4 Merino, M., "La basura espacial: una estrategia de eliminación activa mediante propulsión eléctrica inversa y tethers electrodinámicos," *5th Spanish Space Student Congress*, Laboratorio para Experimentación en Espacio y Microgravedad, Madrid, Spain, 2010.
- 5 Merino, M., "Toberas magnéticas para motores espaciales de plasma," *9th Certamen Universitario Arquímedes de Introducción a la Investigación Científica*, Government of Spain, 2011.
- 6 Merino, M., "Magnetic Nozzles for Plasma Space Propulsion," *Aerospace Testing 2010*, Aerospace Testing, 2010.
- 7 Merino, M. and Ahedo, E., "Toberas magnéticas en futuros motores espaciales de plasma," *XXXIII Reunión Bienal de la RSEF*, Real Sociedad Española de Física, 2011.
- 8 Merino, M., "New electric propulsion technologies investigation by simulation," *18th SPINE Meeting and Workshop*, SPIS/SPINE Community, ESA, 2012.
- 9 Navarro-Cavallé, J., Merino, M., and Ahedo, E., "Plasma Structure Inside and Outside a Helicon Thruster," *39th IEEE International Conference on Plasma Science*, 2012.
- 10 Merino, M. and Ahedo, E., "Advanced Plasma Propulsion with Magnetic Nozzles: Plasma detachment," *63th International Astronautical Congress*, International Astronautical Federation, 2012.

- 11 Merino, M., Pérez, D., Cichocki, F., and Ahedo, E., "Helicon plasma thruster prototypes and modelling status," *International Conference on Phenomena in Ionized Gases*, 2013.
- 12 Merino, M., "Key Processes in Plasma Acceleration and Detachment in a Magnetic Nozzle for Advanced Plasma Thrusters," *31st International Conference on Plasmas and Ionized Gases*, 2013.
- 13 Merino, M., "NOMADS and EP2PLUS: advanced hybrid codes for Hall thrusters, plasma plumes, and S/C interaction," *EPIC Workshop, Brussels*, 2014.
- 14 Merino, M., "2D DIMAGNO and HELWAVE2 simulators for Magnetic Nozzles and Helicon Antenna Sources," *EPIC Workshop, Brussels*, 2014.
- 15 Merino, M., "Non-mechanic thrust pointing system with steerable magnetic nozzle," *EPIC Workshop, Brussels*, 2014.
- 16 Alpatov, A., Cichocki, F., Fokov, A., Khoroshylov, S., Merino, M., and Zakrzhevskii, A., "Calculation of the Impact from plume of ion thruster to orbital debris," *5th International Conference on Space Technologies: Present and Future*, Dnepropetrovsk, Ukraine, 2015.
- 17 Alpatov, A., Cichocki, F., Fokov, A., Khoroshylov, S., Merino, M., and Zakrzhevskii, A., "Algorithm for determination of force transmitted by plume of ion thruster to orbital object using photo camera," *66th International Astronautical Congress*, No. IAC-15,A6,5,5,x27732, International Astronautical Federation, Jerusalem, Israel, 2015.
- 18 Merino, M., Ahedo, E., and Fajardo, P., "Development of physical models of electron cooling in collisionless plasma thruster plumes," *22nd SPINE Meeting and Workshop*, SPIS/SPINE Community, ESA, 2016.
- 19 Domínguez-Vázquez, A., Cichocki, F., Pérez-Grande, D., Merino, M., Fajardo, P., and Ahedo, E., "Hybrid PIC-fluid simulation of plasma thrusters and their plumes," *VKI Lecture Series: Electric Propulsion Systems: from recent research developments to industrial space applications*, No. STO-AVT-263, Von Karman Institute, Von Karman Institute, Belgium, 2016.
- 20 Cichocki, F., Domínguez-Vázquez, A., Pérez-Grande, D., Merino, M., Ahedo, E., and Fajardo, P., "Hybrid particle codes for electric propulsion," *14th Spacecraft Charging Technology Conference*, 2016.
- 21 Merino, M., Fajardo, P., Navarro-Cavallé, J., Chen, X., Babou, Y., and Ahedo, E., "Characteristics and capabilities of the new EP2 plasma propulsion laboratory," *Space Propulsion Conference 2016*, 2016.
- 22 Merino, M. and Ahedo, E., "Modeling magnetized plasma jets in electric propulsion," *International Workshop on Ion Propulsion and accelerator industrial applications*, No. IPAIA-2017-24, CNR, CNR Bari, Italy, 2017.
- 23 Merino, M., Navarro-Cavallé, J., Cichocki, F., Domínguez-Vázquez, A., Wijnen, M., Fajardo, P., and Ahedo, E., "Micro-Propulsion plasma plume measurement and simulation," *2nd International Conference on Micropropulsion and CubeSats*, Singapore, 2018.
- 24 Merino, M., Ahedo, E., Navarro-Cavallé, J., Fajardo, P., and Sánchez-Arriaga, G., "Magnetic nozzles," *EPIC workshop*, London, UK, 2018.

- 25 Cichocki, F., Merino, M., Ahedo, E., Catalán, J. M., and Domínguez-Vázquez, A., "Application of EP2PLUS 3D code to plasma thruster plumes and discharges," *EPIC workshop*, London, UK, 2018.
- 26 Domínguez-Vázquez, A., Pérez-Grande, D., Álvaro Sánchez-Villar, Tian, B., Zhou, J., Fajardo, P., Merino, M., and Ahedo, E., "HYPHEN, a multi-thruster simulation platform," *EPIC workshop*, London, UK, 2018.
- 27 Merino, M., Cichocki, F., Ahedo, E., Catalán, J. M., Domínguez-Vázquez, A., and Fajardo, P., "Electron modeling in hybrid plasma thruster plume simulations," *25th SPINE Meeting and Workshop*, SPIS/SPINE Community, ESA, Noordwijk, Netherlands, 2018.

Invited talks

- 2018-07-20 **Kinetic electron response in a rarified plasma jet expanding into vacuum**, *ES-CAMPIG 2018 conference, Glasgow, UK*, invited lecture.
- 2018-06-11 **Teaching Innovation days. How should university education be in the XXI century?**, *Universidad Carlos III de Madrid*, round table.
- 2018-04-19 **Modeling and testing of space plasma thrusters at EP2 research group**, *FEUP, Universidade do Porto, Porto, Portugal*, invited seminar.
- 2018-01-03 **Magnetic nozzles and electrodeless plasma thrusters**, *Beihang University of Aeronautics and Astronautics, Beijing, China*, invited seminar.
- 2017-03-03 **Modeling magnetized plasma jets in electric propulsion**, *IPAIA 2017 International Workshop, CNR Bari, Italy*, invited talk.
- 2017-01-26 **Modeling the physics of plasma thruster plumes in electric propulsion**, *ESAC, ESA, Spain*, invited seminar.
- 2016-10-11 **Modeling the expansion of plasma thruster plumes in space**, *Southampton University, UK*, invited seminar.
- 2016-09-08 **Round table: "E-learning, distance education: the future of university?" (E-learning y educación a distancia, ¿el futuro de la universidad?)**, *part of the 2-day course "Las Tecnologías de la Información y la Comunicación en la Universidad del siglo XXI"*, organized by the NPO "La Facultad Invisible", Universidad Internacional Menéndez Pelayo.
- 2016-05-26 **EP2 space plasma propulsion: codes and models**, *Ernst-Moritz-Arndt-Universität Greifswald, Germany*, invited seminar.
- 2015-07-30 **Modeling the expansion of magnetized plasma jets in electric propulsion**, *32nd ICPIG, Iași, Romania*, invited lecture.

Teaching activity

Aerospace engineering courses:

- 2018–present **Fourth year course "Space Vehicles and Orbital Dynamics"**, *BSc in Aerospace Engineering (taught in English)*, Universidad Carlos III de Madrid.
- 2018–present **Second year course "Modeling in Aerospace Engineering"**, *BSc in Aerospace Engineering (taught in English)*, Universidad Carlos III de Madrid.
- 2018–present **Second year course "Mechanics applied to Aerospace Engineering"**, *BSc in Aerospace Engineering (taught in English)*, Universidad Carlos III de Madrid.

- 2014–2018 **“Space Systems Design”**, *MSc in Aeronautical Engineering (taught in English)*, Universidad Carlos III de Madrid.
- 2014–2018 **“Astrodynamics and Atmospheric Flight Dynamics”**, *MSc in Aeronautical Engineering (taught in English)*, Universidad Carlos III de Madrid.
- 2014–2018 **Second year course “Introduction to Flight Mechanics”**, *BSc in Aerospace Engineering (taught in English)*, Universidad Carlos III de Madrid.
- 2014–2017 **Fourth year course “Rocket propulsion”**, *BSc in Aerospace Engineering (taught in English)*, Universidad Carlos III de Madrid.
- 2014–2016 **Fourth year course “Aerospace Propulsion Complements I”**, *BSc in Aerospace Engineering (taught in English)*, Universidad Carlos III de Madrid.
- 2013–2015 **Third year course “Aerospace Propulsion”**, *BSc in Aerospace Engineering (taught in English)*, Universidad Carlos III de Madrid.
- 2013–2014 **Fourth year course “Space Systems”**, *BSc in Aerospace Engineering (taught in English)*, Universidad Carlos III de Madrid.
- 2012–2013 **First year course “Linear Algebra” (Matemáticas I)**, *BSc in Aerospace Engineering*, Universidad Politécnica de Madrid.
- 2010–2013 **First year course “Computer Programming” (Informática)**, *BSc in Aerospace Engineering*, Universidad Politécnica de Madrid.
- 2008–2010 **Collaboration in Teaching activities as a student.**
 Problem solving teaching duties in the first year courses “General Mathematics” (Matemáticas Generales) and “Infinitesimal Calculus” (Cálculo Infinitesimal) of the former Aerospace Engineering 5-year Program at Universidad Politécnica de Madrid

Online courses:

- 2015–present **MOOC course “The Conquest of Space: space exploration and rocket science”**, *at the EdX online platform (taught in English)*, Universidad Carlos III de Madrid, <https://www.edx.org/school/uc3mx>.

Other courses and seminars:

- 2017-10 **Magnetic nozzles for electric propulsion**, *EPIC lecture series at CDTI, Madrid*, European Strategic Research Cluster EPIC.
- 2016-11 **Build and launch your own water rocket**, *Madrid Week of Science workshop for the general public*, Universidad Carlos III de Madrid.
- 2016-07 **One-week course “Rock the air, conquer space”**, *including lectures on the fundamentals of rocketry and water-rocket construction and launching*, in collaboration with the BEST association, Universidad Carlos III de Madrid.
- 2015-10 **Organization of a one-week introductory course to Python programming in Aerospace engineering**, in collaboration with the AeroPython association, Universidad Carlos III de Madrid.
- 2014–present **Introductory seminar on LaTeX and LyX**, *two-hour seminars, taught in 2014-02-15 and 2015-02-19*, Universidad Carlos III de Madrid.
- 2014-04-03 **Seminar on Electric Propulsion**, *invited talk by the student association of Aeronautics and Space*, Universidad Carlos III de Madrid.

- 2011-05-19 **Seminar on Magnetic nozzles for Plasma Propulsion**, *seminar imparted within the seminar program of the fluid dynamics department*, Universidad Politécnica de Madrid.
- 2011-03-04 **Introduction to Fortran**, *four-hour seminar*, Universidad Politécnica de Madrid.

Direction of BSc and MSc theses:

- 2018 **MSc Aeronautic Engineering Thesis**, *Fluid-kinetic modeling of propulsive magnetic nozzles*, Judit del Pino Nuez Deniz, Universidad Carlos III de Madrid.
- 2018 **MSc Aeronautic Engineering Thesis**, *Advanced simulation of the complete electric propulsion system associated to the Hall-effect Thruster in EcosimPro*, Jorge Ruiz Torralba, Universidad Carlos III de Madrid.
- 2018 **MSc Aeronautic Engineering Thesis**, *Preliminary Design and Analysis of the Thermal Architecture for the SMILE Satellite Payload Module*, Lorena del Amo Martín, Universidad Carlos III de Madrid.
- 2018 **BSc Aerospace Engineering Thesis**, *Viability and considerations of the electronic components of an observation satellite's PDU orbiting in LEO*, Paloma Maestro Redondo, Universidad Carlos III de Madrid.
- 2018 **BSc Aerospace Engineering Thesis**, *Two-dimensional finite difference code for wave-plasma interaction problems in electric thrusters*, Pedro Jiménez Jiménez, Universidad Carlos III de Madrid.
- 2018 **BSc Aerospace Engineering Thesis**, *Design and analysis of micropropulsion thruster*, Adrián Rubio García, Universidad Carlos III de Madrid.
- 2017 **BSc Aerospace Engineering Thesis**, *Characterization and improvement of a hybrid chemical rocket*, Lara Cristina Sánchez Hernández, Universidad Carlos III de Madrid.
- 2017 **BSc Aerospace Engineering Thesis**, *Implementation and characterization of an open-source plasma plume code*, Pablo Moreno de Santos, Universidad Carlos III de Madrid.
- 2016 **MSc Aeronautic Engineering Thesis**, *CAMSO integration in Eurofighter program*, Cristina Briongos Méndez, Universidad Carlos III de Madrid.
- 2016 **BSc Aerospace Engineering Thesis**, *Design and construction of an upgraded hybrid rocket*, Sara Esteban Corchado, Universidad Carlos III de Madrid.
- 2015 **BSc Aerospace Engineering Thesis**, *Design and implementation of an Eyassat command and control center*, Daniel Expósito Jiménez, Universidad Carlos III de Madrid.
- 2014 **BSc Aerospace Engineering Thesis**, *Design of a Helicon Plasma Thruster prototype*, Santiago Casado Pérez, Universidad Carlos III de Madrid.

Teaching innovation projects:

- 2018–2019 **Step-by-step videos with Problem-solving**, *Mechanics Applied to Aerospace Engineering*, Universidad Carlos III de Madrid.
- 2016–2017 **Learning and evaluation by means of the design, building, and testing of water rockets**, *Rocket Motors BSc course in Aerospace Engineering*, Universidad Carlos III de Madrid.

Courses and Workshops attended

- 2017-03 **International Workshop on Ion Propulsion and accelerator industrial applications**, *Consiglio Nazionale delle Ricerche*, Bari, Italy (duration: 2 day).

- 2016-11 **7th Research and technology days on Space Systems Design & Engineering**, Airbus Safran Launchers and Airbus DS, Paris, France (duration: 2 day).
Workshop on Multidisciplinary Optimization & Concurrent Engineering.
- 2016-07 **AIAA Workshop on Hall-effect thruster electron anomalous transport**, AIAA, Salt Lake City, Utah (duration: 1 day).
- 2015 **Course on Entrepreneurship and creation of technology-based businesses 'Actúa-UPM'**, Universidad Politécnica de Madrid, Madrid, Spain (duration: 40 h).
- 2013-08 **Workshop: Quo vadis, Europa?**, Universidad Internacional Menéndez Pelayo, Santander, Spain (duration: 1 week).
- 2013-04 **Establishing and achieving work objectives**, Instituto de Ciencias de la Educación, Universidad Politécnica de Madrid, Madrid, Spain (duration: 2 days).
- 2013-03 **Galaxies and Cosmology**, Coursera online course, imparted by CalTech (duration 1 month).
- 2012-12 **Quantum Mechanics and Quantum Computation**, Coursera online course, imparted by U. Berkeley (duration 1 month).
- 2012-03 **SPIS (Spacecraft-Plasma Interaction System) software training course**, ESTEC-ESA, Noordwijk, The Netherlands (duration: 1 week).
- 2012-03 **Course on Time Management**, Instituto de Ciencias de la Educación, Universidad Politécnica de Madrid, Madrid, Spain (duration: 2 days).
- 2011-08 **Europe and Global Government (Global Economy)**, taught by Josep Borrell, at Universidad Internacional Menéndez Pelayo, Santander, Spain (duration: 1 week).
- 2010-2011 **Course on Initial Teaching Education**, Instituto de Ciencias de la Educación, Universidad Politécnica de Madrid, Madrid, Spain (4 ECTS).
- 2010-08 **Summer School "Blas Cabrera" on Research, Teaching and Innovation**, Universidad Internacional Menéndez Pelayo, Santander, Spain (duration: 1 week).
- 2010-04 **EcosimPro Software training course**, Escuela Técnica Superior de Ingenieros Aeronáuticos / Empresarios Agrupados, Madrid, Spain (duration: 1 week).
- 2010-03 **ATHENS Course "The PIV method in Fluid Mechanics"**, ATHENS Program, Czech Technical University, Prague, Czech Republic (duration: 1 week).
- 2009-11 **ATHENS Course "Nanotechnologies"**, ATHENS Program, École Nationale Supérieure des Techniques Avancées, ParisTech, Paris, France (duration: 1 week).
- 2008-11 **Workshop on Satellite Navigation**, Escuela Técnica Superior de Ingenieros Aeronáuticos / GMV, Madrid, Spain (duration: 10 days).
- 2007-08 **CVA Summer School on the preparation of future European launch vehicles**, Community of Ariane Cities (CVA) / Fachhochschule Heilbronn, Heilbronn, Germany (duration: 1 month).

Languages

English	Proficient	Cambridge Certificate in Advanced English (2001) High degree from the National "Escuela Oficial de Idiomas" (2004)
German	Intermediate level	Universidad Politécnica de Madrid, German B2 language course (2012) Intermediate II degree from the National "Escuela Oficial de Idiomas" (2013)
Italian	Intermediate level	Merimée-De Sebastian course, National "Escuela Oficial de Idiomas" (2008)
French	Intermediate level	

Miscellanea

2017–present **Member of the Celera Program**, *for entrepreneurship and personal development*, <http://www.acelerame.org/>.

Selected to be part of the group of 10 young professionals in Spain admitted into the program in 2017 (third Generation)

2014–present **Co-founder of 'La Facultad Invisible'**, *non-profit NGO for the improvement of Spanish higher education*, <http://lafacultadinvisible.com>.

- Coordinator of the Architecture and Engineering branch of the association (2014–2015).
- Coordinator of the organizing committee for the First Congress of 'La Facultad Invisible', which took place the 13th of June at the 'Circulo de Bellas Artes' of Madrid (June 2015).