PhD in Aerospace Science and Technology

Open day

Manuel Soler

Director PhD Program Aerospace Engineering

masolera@ing.uc3m.es

Open day

20th April 2022. 13.00 CET

uc3m PHD

Aero space

Agenda

- **Welcome to UC3M**
- **Description of the PhD Program**
- Aerospace Engineering Research lines and PhD Positions
- Industrial Doctorates and Institutional Cooperations
- Questions and Open Discussion
- Networking Lunch

Mission

This Ph.D. program responds to the need for **specific training and research in the field of Aerospace Engineering**. The main objective of the program is to capacitate students with a series of **technical and scientific competences** in the field of **aerospace science and technologies**. Graduate doctors of the program will be qualified to find innovative and disruptive solutions to high-impact and high-interest problems in the field of aerospace engineering through a combination of **experimental, computational, and technological methodologies** pertaining to aerospace science and engineering with a marked **multidisciplinary, intersectoral and international character**.

Career opportunities:

- a scientific career in universities or national and international research centers;
- a professional career in the Aerospace R&D sector;
- and the creation of technology-based companies through patents and/or registered software as direct outcomes of the research.

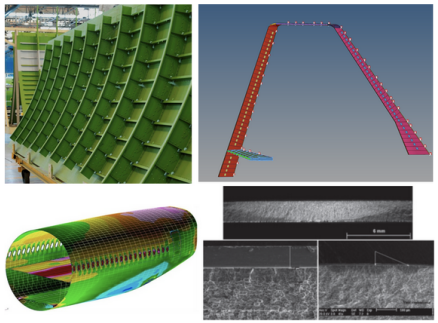
Research Areas

The program is structured in two large areas:

- **Aeronautics**
- **Space**

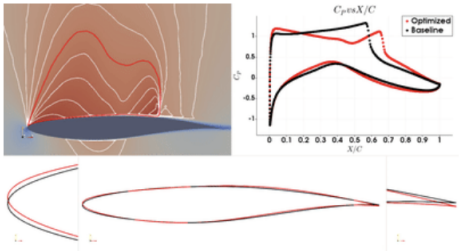
Research Lines - I

Aerospace Structures and Materials



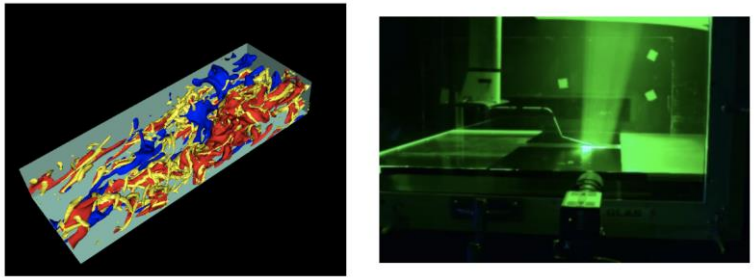
- Aeronautical structures
- Composites and advanced materials.
- Structural health monitoring
- Structural dynamics and vibroacoustics
- Aeroelasticity

Aerospace Design and Manufacturing

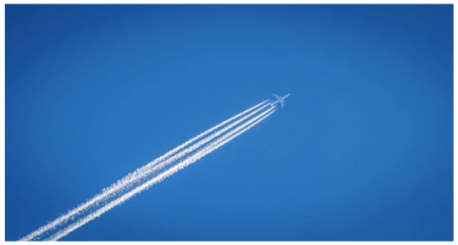


- Optimization and multidisciplinary design
- Non-conventional aircraft
- Manufacturing processes
- Airborne wind energy systems

Aerodynamics and Propulsion



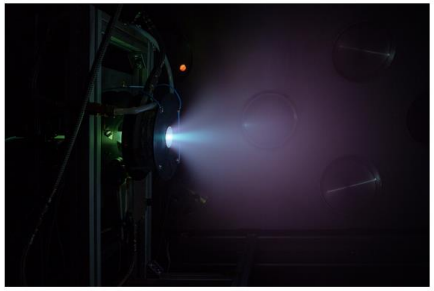
Aircraft Operations



- Commercial Aircraft Trajectory Optimization
- Meteorological Uncertainty Management
- Aviation Induced Environmental Impact
- Artificial Intelligence Applications to Air Traffic Management
- Unmanned Air Vehicles (UAVs)

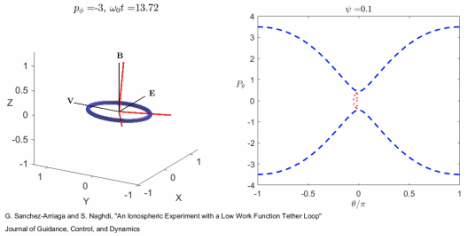
Research Lines - II

Propulsion and Space Environment



- Plasma thrusters
- Magnetic nozzles
- Radiofrecuency and microwaves sources
- Plasma-spacecraft interactions
- Space Debris Removal
- Plasma waves and ECR thrusters
- Plasma diagnosis

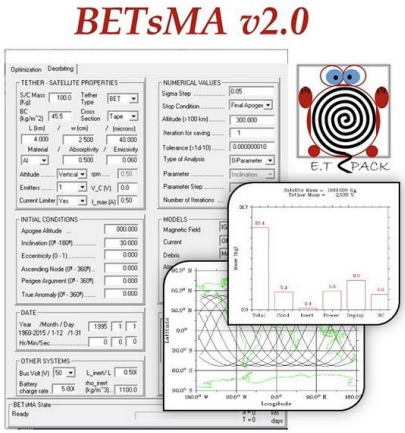
Astrodynamics



G. Sanchez-Arriaga and S. Naghdi, "An Ionospheric Experiment with a Low Work Function Tether Loop"
Journal of Guidance, Control, and Dynamics

- Space Tethers
- Mission analysis and trajectory optimization
- Orbit Determination and Space Surveillance and Tracking

Space Systems

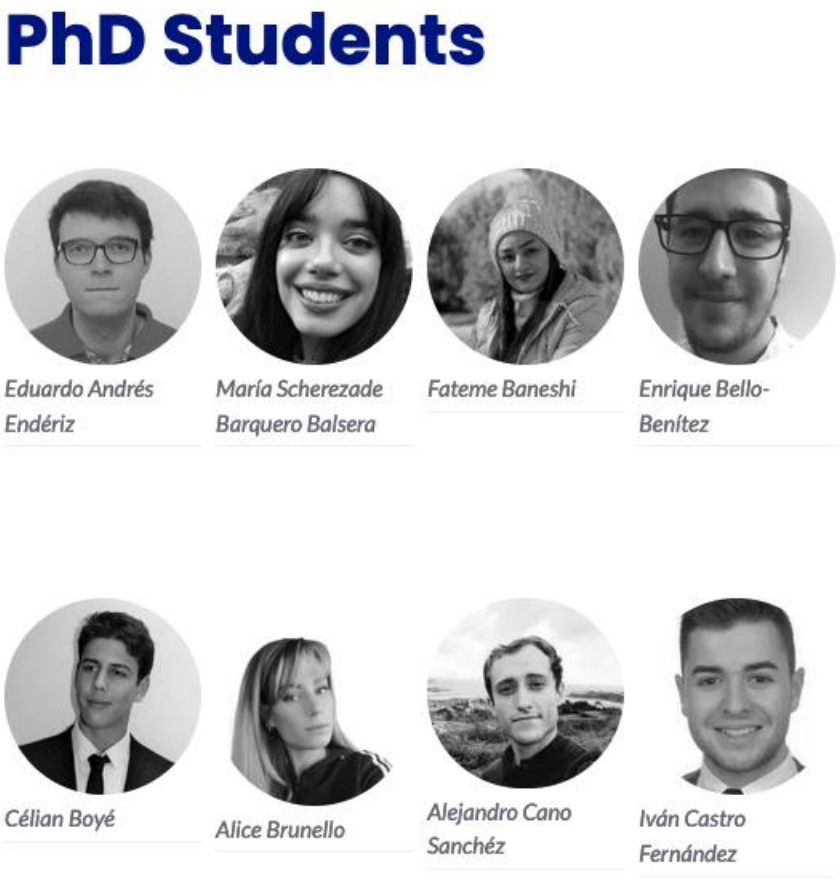


- Satellite Design and Systems Engineering
- Subsystems design
- Onboard software
- Communications
- Space Electronics
- Space automation
- Scientific Instrumentation

Aerospace Control

- Robust Modeling, Analysis & Control
- Fault Detection and Isolation (FDI)
- Fault Tolerant Control (FTC)
- Verification & Validation

PhD Students



- By nationality
  - 21 Spanish
  - 10 Italian
  - 5 Iraninian
  - 3 French
  - 1 Norweigian
  - 1 Chinese
- By Gender
  - 6 Women
  - 35 men
- By Sector
  - 31 Academic PhDs
  - 7 Industrial PhDs
  - 3 institutional PhDs in cooperation

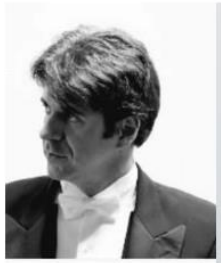
Here you can see 8 out of a total of 41 PhD Students
https://uc3m-phd-aerospace.es/phd-students/

Supervisors

Supervisors

Eduardo Ahedo

- [UC3M Research Portal]
- [EP2 Research Group]



Joaquín Míguez Arenas

- [UC3M-Department of Signal Theory & Communications]
- [WebPage_JoaquínArenas]

Guillermo Carpintero del Barrio

- [UC3M Research Portal]
- [Optoelectronic and Laser Technology (GOTL)]

Here you can see 3 out of a total of 21
https://uc3m-phd-aerospace.es/supervisors/

Competitive Projects

ZARATHUSTRA – Revolutionizing advanced electrodeless plasma thrusters for space transportation.

ERC Starting Grant 2020: 950466

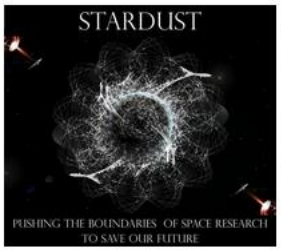
NEXTFLOW aims to develop the next-generation flow diagnostics concept aimed to flow control.

ERC Starting Grant 2020: 949085

E.T.PACK – Electrodynamic Tether Technology for Passive Consumable-less Deorbit Kit.

H2020 FET Open. Grant number: 828902

Co-funded by the Horizon 2020 programme of the European Union



Stardust-R – Stardust Reloaded project within EU H2020 MSCA ITN

H2020 Marie Curie ETN. Grant number: 813644

FlyATM4E – Flying Air Traffic Management for the benefit of environment and climate

H2020 SESAR. Grant number: 891317

ESPEOS: Electric Space Propulsion for Earth Orbit Satellites (2020–2022). Ministry of Science and Innovation, National I+D plan, Spanish Government.

Grant number: PID2019-108034RB-I00.

PROMETEO – Propulsión por plasma y fusión nuclear: innovando el transporte espacial

Grant number: Y2018/NMT-4750 (PROMETEO-CM)

See the complete list https://uc3m-phd-aerospace.es/projects/

Activities - Seminars

Past Seminars

29 MAR 2022 — PhD Seminar Series: "Partitioned Parametrized Variational Procedure for the Generation of Theorems of Structural Analysis"

Prof. Luciano Demasi from San Diego State University.

16 DIC 2021 — PhD Seminar Series: "Time resolved reaction and diffusion limited carbon oxidation dynamics at the micro-scale"and "Particle-laden flows, from incompressible turbulence to supersonic jets"

Dr. Francesco Panerai and Dr. Laura Villafañe from University of Illinois Urbana-Champaign.

15 DIC 2021 — 'Raman Spectroscopy for space applications. A new instrument's generation for planetary exploration'

Andoni Moral. Principal Investigator, Space programs at INTA

17 NOV 2021 — Airborne Wind Energy. Power generation with kites

Prof. Roland Schmehl. Section Wind Energy, Faculty of Aerospace Engineering, Delft University of Technology

30 JUNE 2021 — Probing the physics of ion thrusters with coherent light

Prof. Stéphane Mazouffre from CNRS, ICARE laboratory, Orléans, France

20 MAY 2021 — Monte-Carlo Science

Javier Jimenez from Technical University of Madrid (UPM)

28 APRIL 2021 — How Nature Flies

Ignazio Maria Viola from University of Edinburgh

23 MARCH 2021 — UC3M Aerospace ERC Starting Grant Panel

ERC NEXTFLOW – Next-generation flow diagnostics for control
Stefano Discetti from UC3M

ERC ZARATHUSTRA – Revolutionizing advanced electrodeless plasma thrusters for space transportation
Mario Merino Martínez from UC3M

Coming up:

- Andrea Ianelli (ETH), April 29th
- Isabel Pérez Grande (UPM), May 9th
- Thomas Ott (Airbus), May 11th
- Massimiliano Zanin (CSIC), May 17th

Stay tunned:

https://uc3m-phd-aerospace.es
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UC3M - PhD Program in Aerospace Engineering

Follow us:

Activities – PhD Doctoral Meetings

PhD Aerospace Engineering – Doctoral Meetings 20-21. List of videos

Coming up:
Doctoral Meeting 2022: June 15th and 16th,
Salón de Grados, Leganés

Activities – Stays

> *"The journey not only broadens the mind, it shapes the mind." Bruce Chatwin*

Student: Iván Castro Fernández
Institutions: Delft University of Technology
Department/Group: Aerospace Department (AWES group)
Host: Roland Schmehl
Period: from October 2021 to February 2022

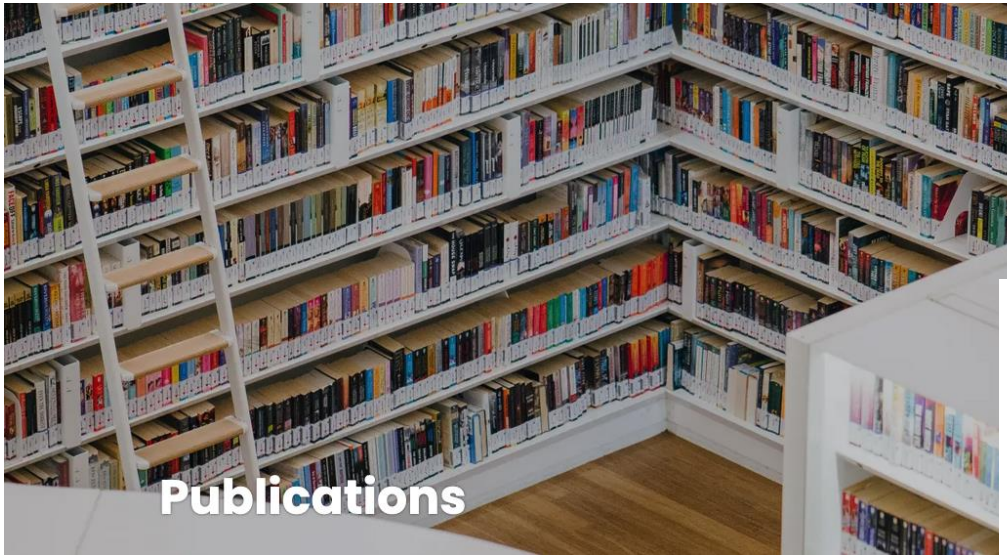
Student: Guillermo Escribano Blázquez
Institutions: European Space Operations Center
Department/Group: Space Debris Office (OPS-SD)
Host: Jan Siminski
Period: from November 2021 to December 2021

Student: Luca Chiabò
Institutions: Los Alamos National Laboratory
Department/Group: LANL–Applied Math.&Plasma Physics
Host: Gian Luca Delzanno
Period: from to December 2021 to March 2022

Student: Eduardo Andrés Endériz
Institutions: Escuela Politécnica Federal de Lausana (EPFL)
Department/Group: SYCAMORE Lab, (EPFL)
Host: Maryam Kamgarpour
Period: from to December 2021 to March 2022

Student: Sadaf Shahsavani
Institutions: Universitá di Padova (Italy)
Department/Group: Dipartimento di Ingegneria Industriale
Host: Enrico Lorenzini
Period: from to March 2022 to May 2022

Activities - Publications



JCR Journal Papers

2022

- **Escribano, G.**, Sanjurjo-Rivo, M., Siminski, J. A., Pastor, A., & Escobar, D. (2022). "Automatic maneuver detection and tracking of space objects in optical survey scenarios based on stochastic hybrid systems formulation". *Advances in Space Research*. Doi: https://doi.org/10.1016/j.asr.2022.02.034
- **Garcia-Gonzalez, S.**, & Sanchez-Arriaga, G. (2022). Attitude determination and control for the deployment preparation phase of a space tether mission. Acta Astronautica. Doi: https://doi.org/10.1016/j.actaastro.2022.01.011
- **Maddaloni, D.**, Domínguez-Vázquez, A., Merino, M., & Terragni, F. (2022). Data-driven analysis of oscillations in Hall thruster simulations. Plasma Sources Science and Technology. Doi: https://doi.org/10.1088/1361-6595/ac6444
- **Perales-Díaz, J.**, Domínguez-Vázquez, A., Fajardo, P., Ahedo, E., Faraji, F., Reza, M., & Andreussi, T. (2022). Hybrid plasma simulations of a magnetically shielded Hall thruster. *Journal of Applied Physics*, *131*(10), 103302. Doi: https://doi.org/10.1063/5.0065220
- **Simorgh, A.**, Soler, M., González-Arribas, D., Matthes, S., Grewe, V., Dietmüller, S., ... & Meuser, M. M. (2022). "A Comprehensive Survey on Climate Optimal Aircraft Trajectory Planning". *Aerospace*, *9*(3), 146. Doi: https://doi.org/10.3390/aerospace9030146

Practical Information

As a general rule, to access the program it is required to hold an official **Bachelor's degree** plus a minimum of 60 ECTS of a **Master's degree**. The sum of ECTS for both degrees must be a minimum of 300 ECTS.

Preferred background is Aerospace engineering, though other fields are also welcome

- Science (Mathematics or Applied Physics)
- Engineering and Architecture: Manufacturing Engineering, Systems Engineering and Automation, Electrical Engineering, Mechanical Engineering, Thermal Engines and Machines, Fluid Mechanics, Continuum Mechanics and Structural Analysis, Chemical Engineering, Telematic Engineering, Electronic Technology or Signal Theory and Communications.

In order to apply for the **admission**:

- Have a supervisor (and a topic within a resarch line)
- Search for funding:
  - Directly provided via contracts associated to projects
  - Get a scholarhsip
- Fill the paperwork

PhD requirements:

- (at least) 1 JCR Journal Paper
- Participate in the Doctoral Meetings
- (at least) 1 Presentation in a conference
- 3 months stay for the international mention
- Attend Seminars on a regular basis
- OPTIONAL: Transversal Credits.

CAM - Personal Investigador Predoctoral en Formación.

Agenda

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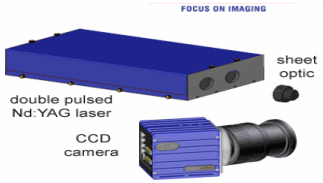
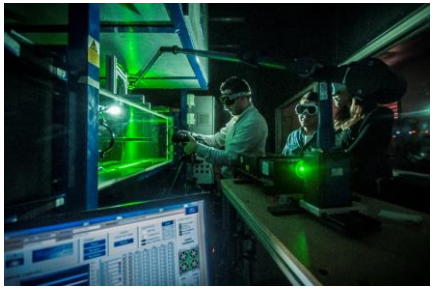
Experimental Aerodynamics and Propulsion (EAP) LAB

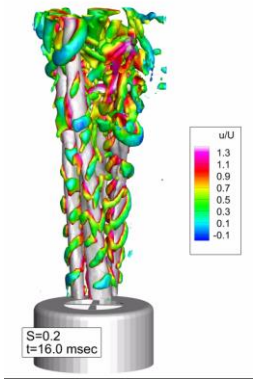
sdiscett@ing.uc3m.es
aianiro@ing.uc3m.es
mraiola@ing.uc3m.es

Development of non-intrusive measurement techniques





PIV setup example fromLaVision webpage



Tomographic PIV in swirl flows
(Ianiro et al, JFM)

nextflow

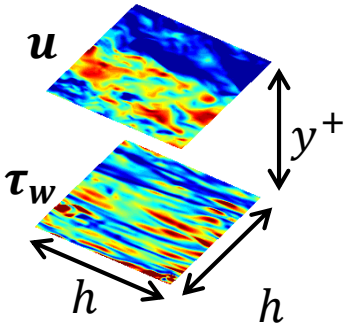
Next-generation flow diagnostics for control

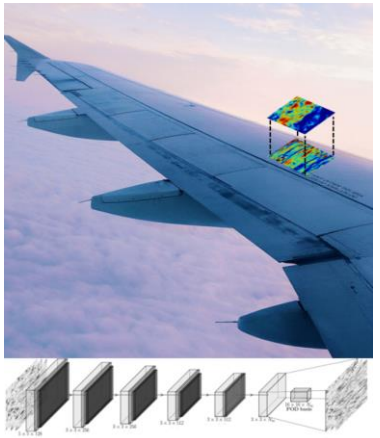
- Enhancing measurements with Machine Learning
- Dimensionality reduction for flow modelling and control

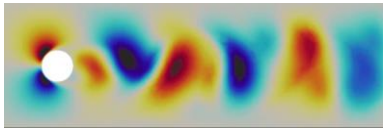
https://erc-nextflow.uc3m.es/

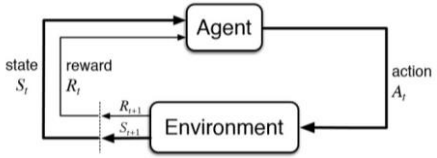
Machine-learning for flow control

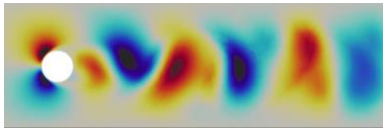
- Flow sensing
- Active flow control (genetic algorithms, deep reinforcement learning)











sdiscett@ing.uc3m.es
aianiro@ing.uc3m.es
mraiola@ing.uc3m.es

uc3m PHD

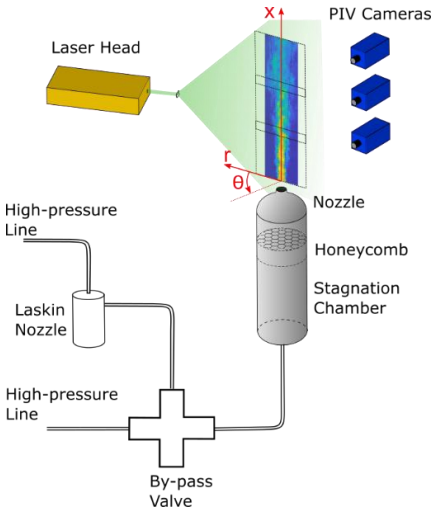
Aerospace

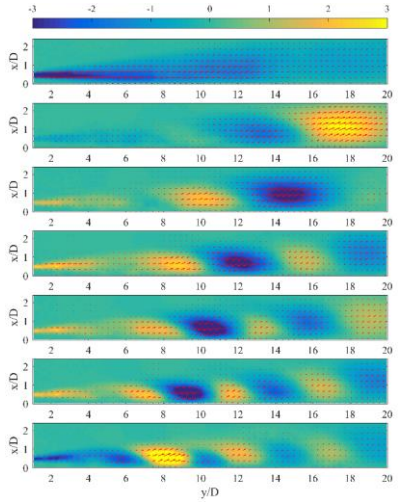
PhD opportunities with EAP LAB

1 PhD position open in

Aeroacoustics and flow control

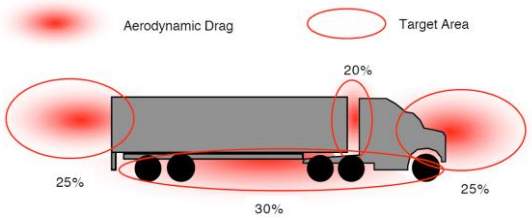
(deadline April 30!)

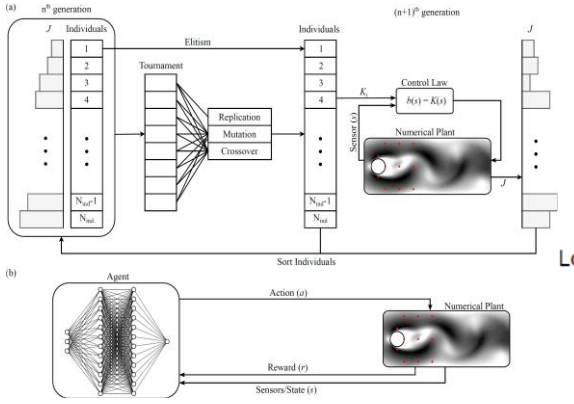


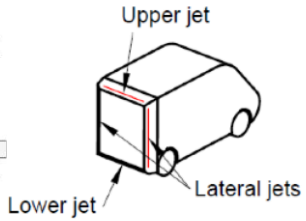


1 PhD position to be opened at fall/winter 2023

Drag reduction of road vehicles with Artificial Intelligence







CFD Lab

http://aero.uc3m.es/cfd.html

uc3m PHD Aerospace

Expertise

Fluid mechanics, aerodynamics and turbulence

High Performance Computing
Development of tailored CFD algorithms and codes
Use of open source solvers: OpenFoam, Nek5000, ...

Research lines

1) Bio-inspired Aerodynamics for Micro-Air-Vehicles

- Wing-wing interactions in tandem wings (i.e. dragonflies)
- Effect of wing flexibility on the aerodynamic performance
- Self-propulsed bodies: coupling of dynamics and aerodynamics
- MAV trimming, control, …

2) Bio-inspired Aerodynamics for Energy harvesting

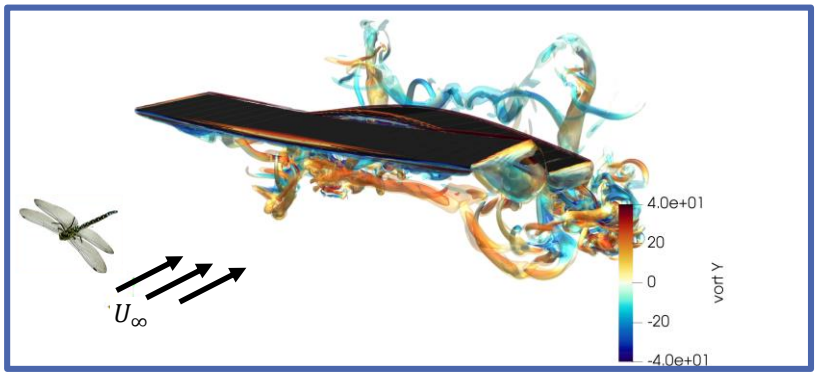
- Design of rotors for low-power low-wind harvesters, based on winged seeds.
- Effect of free-stream turbulence

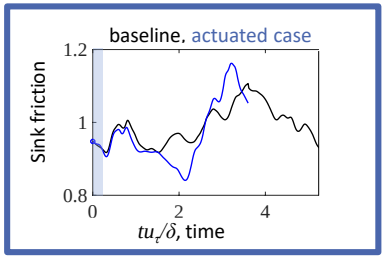
3) Wall-bounded turbulence

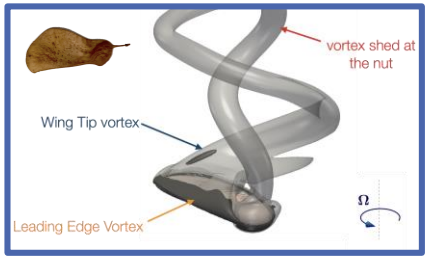
- Skin friction control using local actuators/sensors

4) Cardiovascular fluid mechanics opportunistic project

- Patient specific simulations of left atrium stasis







Collaborations

KIT (Germany), UT-Wien (Austria), U. Maryland (EEUU), U. Washington (EEUU), HGUGM (Madrid), UPM (Madrid), …

Interested in a PhD at the CFD lab?

Oscar Flores, oflores@ing.uc3m.es
Manuel Garcia-Villalba, mgarciav@ing.uc3m.es

ASD Lab

Aeroelastic & Structural Design Group

Rauno Cavallaro, Andrea Cini

https://aero.uc3m.es/asd_lab-home/

Vision:

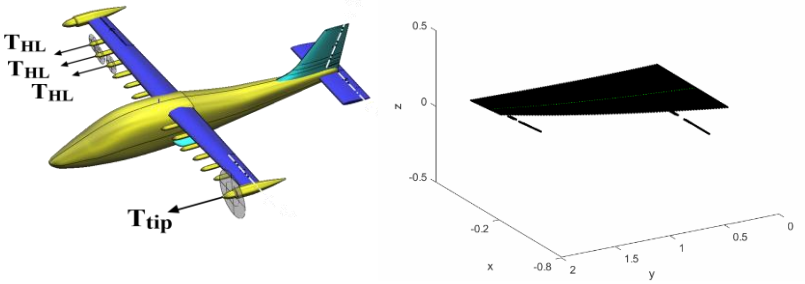
To perform research on aircraft design and manufacturing aiming at fostering the introduction of efficient, cost effective environmentally friendly, design methodologies, materials, structural configurations and technologies.

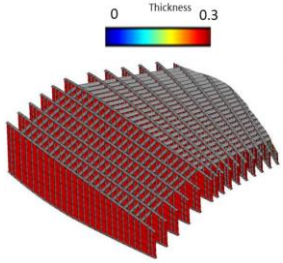
Aerostructures			Aircraft Design MDAO		Flight Physics	
Structural optimisation	Structural design	DT virtual certification	Next-generation aircraft	Electric aircraft	Aeroelasticity & Loads	Aircraft Aerodynamic Design
Minimum weight structural optimisation	"Non black-metal" composite design	Composite impact damage evolution (bird-strike, FOD)	Unconventional aircraft optimal design	Hybrid/Electric propulsion configuration	Aeroelastic static and dynamic stability and responses	Transonic Aerodynamic Shape Optimization
Buckling of composite stiffness panels	Analytical tools for quantitative configuration selection	Durability and DT design techniques	Collaborative Multidisciplinary Design Analysis and Optimization	Thermal management	Aeroelasticity with aerodynamic and structural nonlinearities	Induced Drag minimization
Optimal design for certification	Concurrent design for manufacturing and assembly	Short crack nucleation and growth	Aero-structural MDAO	Performance, weight and cost module adaptations	Aeroelastic sensitivities	Automated Aerodynamic Module (Geometry, Mesh, Analysis, Optimization)

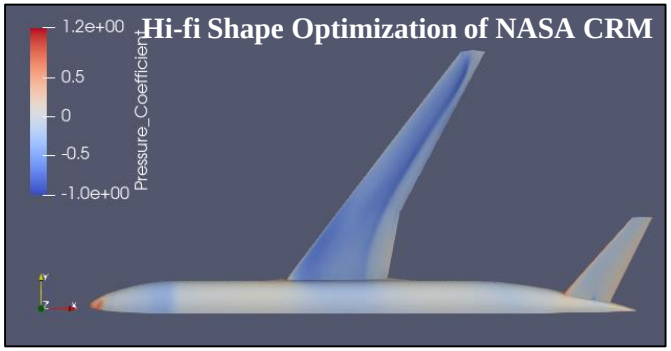
ASD Lab

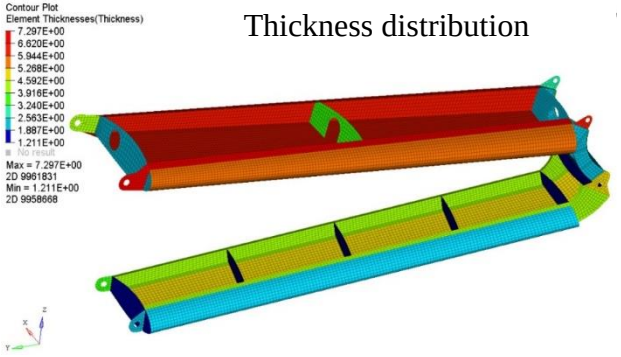
Available PhD positions:

1. Multidisciplinary Design and Optimisation of H2-powered green aircraft
2. Aerostructural and aeroelastic optimisation of new generation flexible aircraft
3. Structural optimisation methodologies for sizing, design for manufacturing and design for certification of advanced composite structures (**Available now**)
4. Fatigue and damage tolerance certification and qualification methods for primary additively manufactured structures

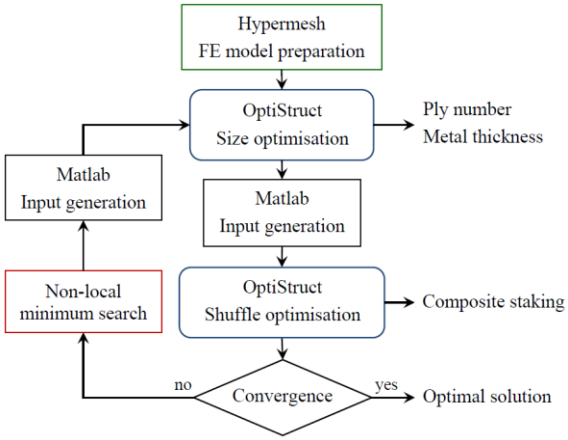


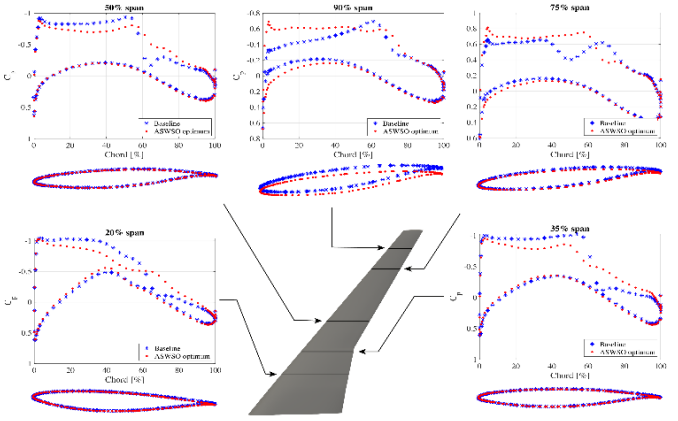




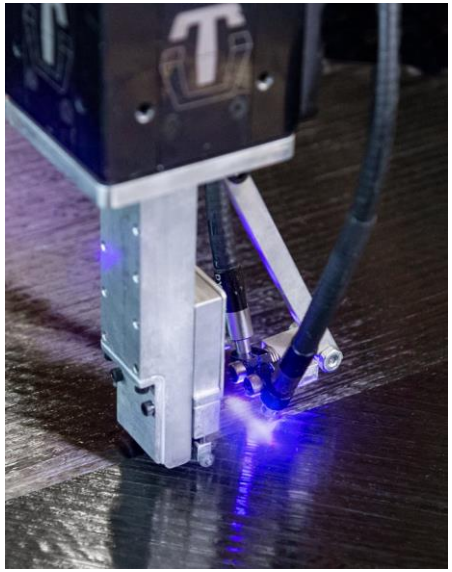


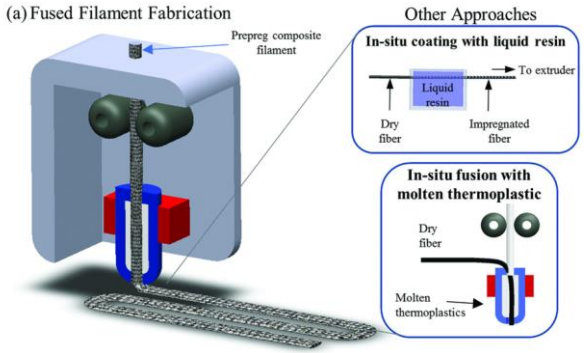
Thickness distribution

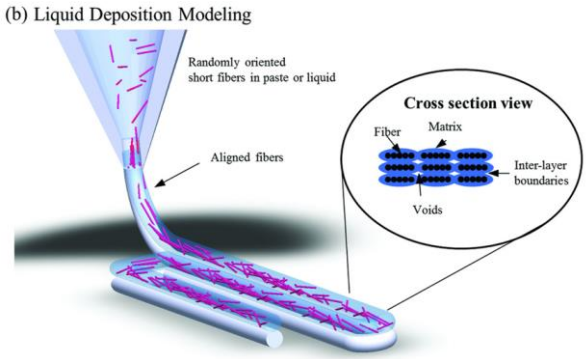


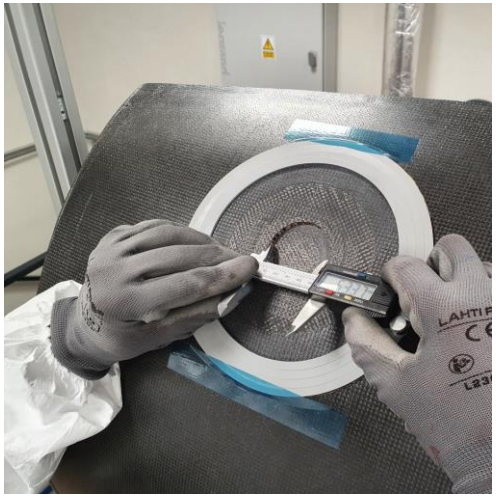


Composite Materials







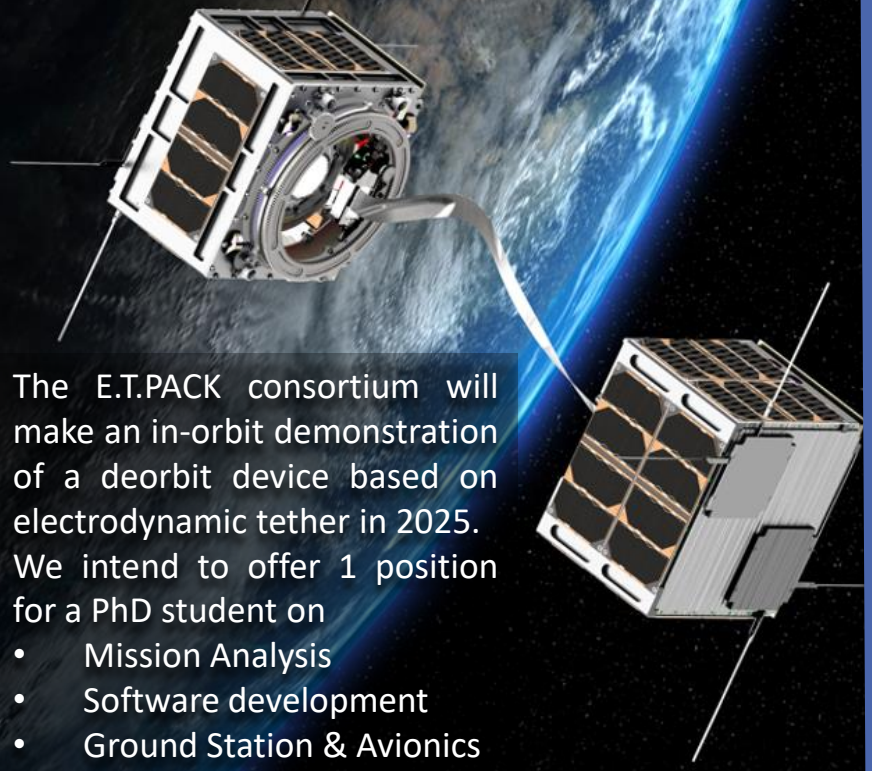


Additive Fiber Reinforced Composite Repairs for Aircrafts

- Scope: Develop a novel additive material deposition system that produces high-quality composite laminate repairs that return parts to oringial strength.

Marta Moure
(mmmoure@ing.uc3m.es)

Electrodynamic Tethers

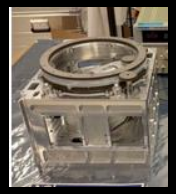


- The E.T.PACK consortium will make an in-orbit demonstration of a deorbit device based on electrodynamic tether in 2025.
- We intend to offer 1 position for a PhD student on
  - Mission Analysis
  - Software development
  - Ground Station & Avionics

E.T PACK

19/22

TRL 4



22/25

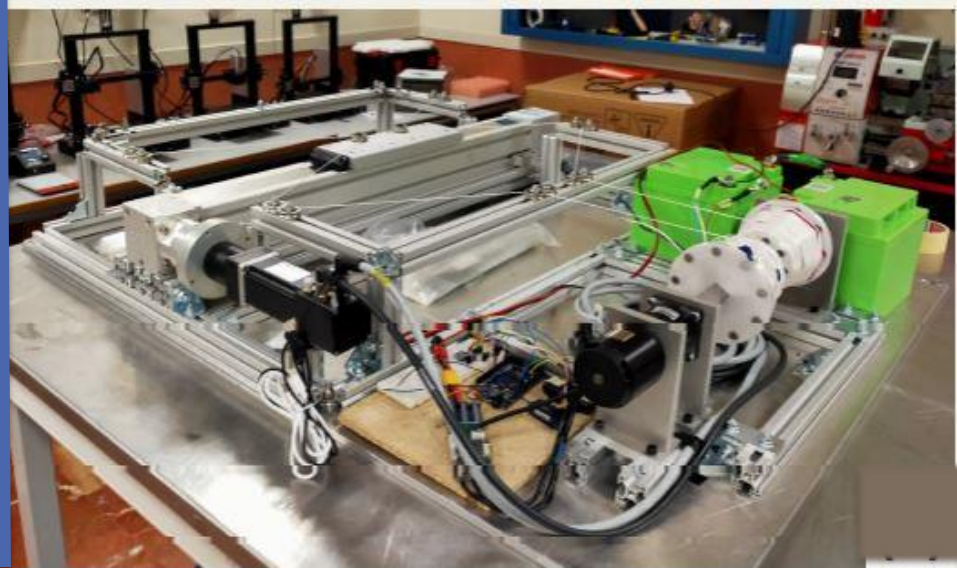
TRL 8

E.T.PACK-F

www.etpack.eu

Airborne Wind Energy

- In collaboration with CT Ingenieros, UC3M is developing a prototype of an Airborne Wind Energy (AWE) machine.
- We intend to offer 1 position for a PhD student on
  - Hardware development/Flight testing.
  - Aeroelastic Analysis



Space Transportation

M. Sanjurjo
(msanjurj@ing.uc3m.es)

- Earth Orbit
  - Guidance. MOLTO-OR
    - PhD David Morante. https://github.com/uc3m-aerospace/MOLTO-OR
  - GNC Cubesat.
    - Industrial PhD with IENAI Space. PhD Giuseppe di Pasquale
- Beyond Earth Orbit.
  - Guidance:
    - MOLTO-IT. https://github.com/uc3m-aerospace/MOLTO-IT
    - MOLTO-3BP. https://github.com/uc3m-aerospace/MOLTO-IMOLTO-3BP
  - Navigation:
    - Optical Navigation CNN (Alfredo Escalante)
  - Control:
    - Robust Model-Predictive control. PhD Thomas Frekhaug
  - GNC Asteroid landing:
    - ETN Pelayo Peñarroya with Deimos

Space Safety

M. Sanjurjo
(msanjurj@ing.uc3m.es)

- Space Surveillance and Tracking
  - Uncertainty Propagation
    - ESA projects
  - Cataloguing
    - Industrial PhD with GMV. PhD Alejandro Pastor
    - Industrial PhD with GMV. PhD Alejandro Cano
  - Automatic manoeuvre detection
    - PhD Guillermo Escribano. Co-funded by ESA.
  - Sensors: Laser Ranging
    - PhD Manuel Sánchez Piedra. With Real Observatorio de la Armada.
- **PhD offer in:**
  - **Stochasticity and Chaos in Astrodynamics.**

Aircraft Operations

uc3m PHD Aerospace

Research lines:

- **Aircraft Trajectory optimization (Met and Climate)**
  - Optimal control (analytical, numerical),
  - Uncertainty
  - metaheuristic optimization
  - 4 on-going PhD Students
- **Machine learning applied to ATM**
  - NN for storm prediction,
  - NN for capacity/demand imbalances
  - NN for climate hotspots
  - 1 on-going PhD Student

On-going Competitive Projects as Principal Investigator (PI)

Comunidad de Madrid – Hydrogenating CM-UC3M

HYDROGENATING CM-UC3M – Aviation and climate change: HYDROGEN-powered aircraft model design and climate-optimal aircraft operations using ArTificial INtelliGence.

SESAR Joint Undertaking – European Commission – ALARM

ALARM -Multi Hazard Monitoring and Early Warning System Horizon 2020. Call: H2020-SESAR-2019-2 (SESAR 2020 EXPLORATORY RESEARCH). Nov 2020 – Dec 2020. 1 Mi. €

SESAR Joint Undertaking – European Commission – FlyATM4E

FlyATM4E -Flying Air Traffic Management for the benefit of environment and climate. Horizon 2020. Call: H2020-SESAR-2019-2 (SESAR 2020 EXPLORATORY RESEARCH). May 2020 – Dec 2020.2 Mi. €

SESAR Joint Undertaking – European Commission – FMP-Met

FMP-Met -Meteorological uncertainty management for Flow Management Positions. Horizon 2020. Call: H2020-SESAR-2019-2 (SESAR 2020 EXPLORATORY RESEARCH). May 2020 – Dec 2020. 1 Mi. €

SESAR Joint Undertaking – European Commission

ISOBAR -Artificial Intelligence Solutions to Meteo-Based DCB Imbalances for Network Operations Planning. Horizon 2020. Call: H2020-SESAR-2019-2 (SESAR 2020 EXPLORATORY RESEARCH). May 2020 – Dec 2020.2 Mi. €

SESAR Joint Undertaking – European Commission – START

START – a Stable and resilient ATM by integrating Robust airline operations into the network. Horizon 2020. Call: H2020-SESAR-2019-2 (SESAR 2020 EXPLORATORY RESEARCH). May 2020 – Dec 2020. 2 Mi. €

Gobierno de España – Ministerio de Ciencia, Innovación y Universidades – MetATS

MetATS – Managing meteorological uncertainty for a more efficient air traffic system. RTI2018-098471-B-C32. CONVOCATORIA 2018 DE PROYECTOS I+D+i «RETOS INVESTIGACIÓN» DEL PROGRAMA ESTATAL DE I+D+i ORIENTADA A LOS RETOS DE LA SOCIEDAD-MINISTERIO DE CIENCIA, INNOVACIÓN Y UNIVERSIDADES. 2019-2021. 2019-2021.

SESAR Joint Undertaking – European Commission – Engage

STORMY – A pilot/dispatcher support tool based on the enhanced provision of thunderstorm forecasts considering its inherent uncertainty. Funded by Engage, The SESAR H2020 Research Knowledge Transfer. 2019-2021.

Aviation Met. hazards

Climate change

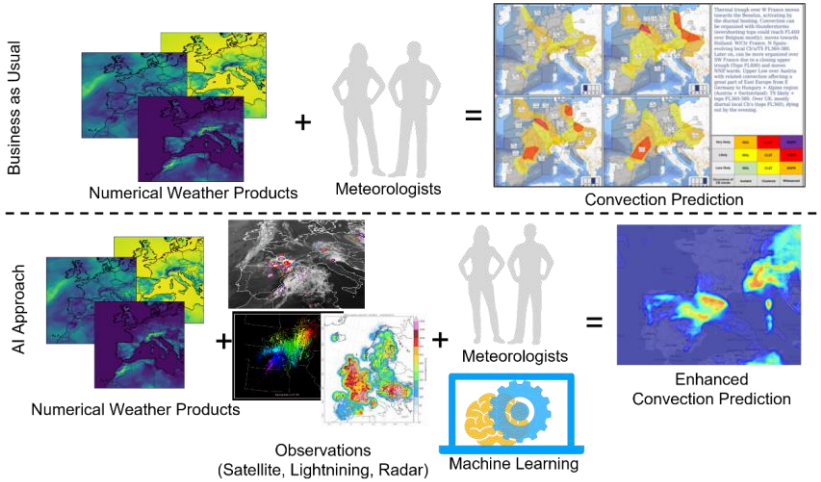
AIRBUS · METEO FRANCE · BOEING · SWISS · CRIDA · DLR · EUROCONTROL · PhD A · IASB · TU Delft · ENAC Ecole Nationale de l'Aviation Civile · Cranfield University · Paris Lodron University Salzburg · LINKÖPING UNIVERSITY · TUHH Technische Universität Hamburg · University of Zagreb Faculty of Transport and Traffic Sciences

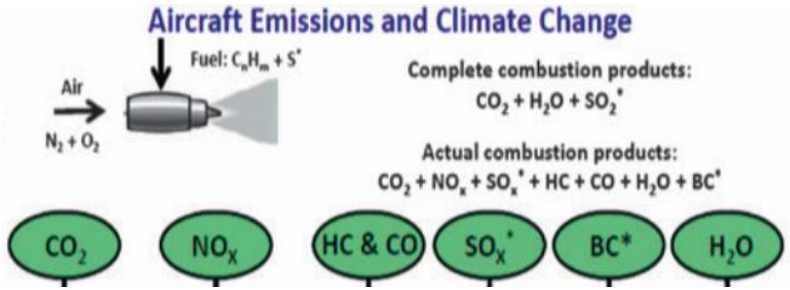
Aircraft Operations

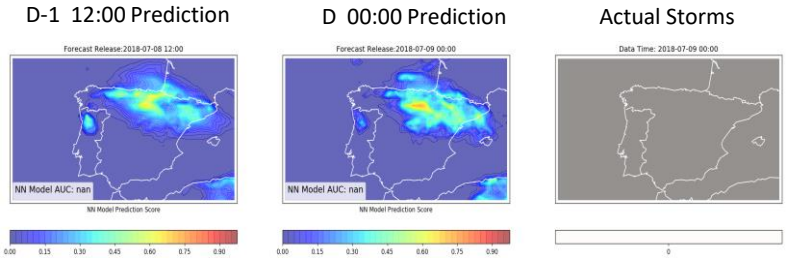
M. Soler
(masolera@ing.uc3m.es)

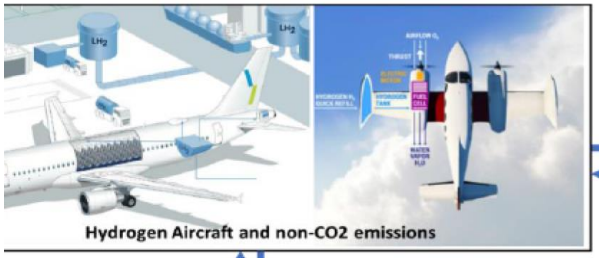
uc3m PHD

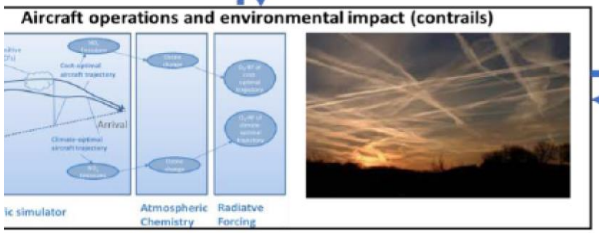
Aerospace

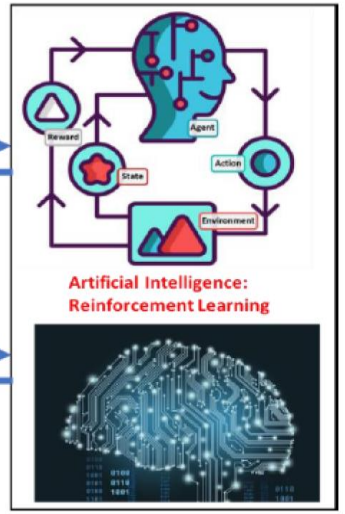


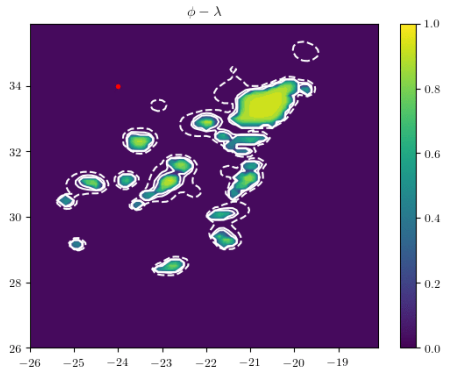








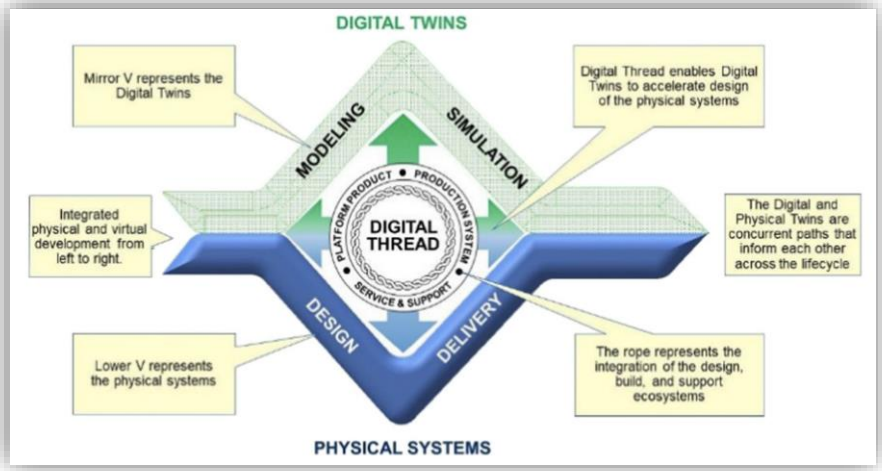




- **1 PhD Position in Aviation, AI, and Climate Change (Fall 2022)**
- **1 PhD Position in Data-enhaced Atmospheric Modelling in airport operations (End 2022-Beginning 2023)**

Systems Engineering applied to ATM

J. García-Heras
(gcarrete@ing.uc3m.es)



// Testing software in air traffic control systems costs much more than building them. Software engineers strive to find methodological and process-level solutions to balance costs and to better distribute verification efforts among all development phases. Model-driven approaches could provide a solution. //

Jason Hatakeyama, Daniel Seal, Don Farr and Scott Haase. "Systems Engineering "V" in a Model-Based Engineering Environment: Is it still relevant?," AIAA 2018-5326. 2018 AIAA SPACE and Astronautics Forum and Exposition. September 2018.

G. Carrozza, M. Faella, F. Fucci, R. Pietrantuono and S. Russo, "Engineering Air Traffic Control Systems with a Model-Driven Approach," in IEEE Software, vol. 30, no. 3, pp. 42-48, May-June 2013, doi: 10.1109/MS.2013.20.

PhD position: A SYSTEMS ENGINEERING APPROACH TO THE AIR TRAFFIC MANAGMENT SYSTEM.

- ❑ Model-Base System Engineering
- ❑ Digital-Twin
- ❑ Early Failure Detection
- ❑ Modelling and Simulation

Dr. Andrés Marcos Esteban
Beatriz Galindo Senior Distinguished Investigator
UC3M-SENER Aerospace Chair & ST3LLAR Space lab Director

Experience, Technological Domains & Application Systems

Education: Aerospace Eng.: BSc'97 (St. Louis U., USA) , MSc'01 & PhD'04 (U. of Minnesota, USA)

Academic Experience (9 years): University Leicester (UK), University of Bristol (UK), UC3M (Spain)

Industrial Experience (9 years): Honeywell Labs (USA), Deimos Space (Spain), TASC Ltd (UK)

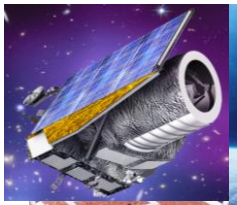
Technological Domains

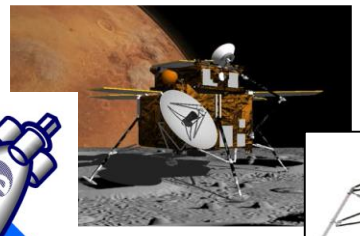
Robust
Modeling, Analysis & Control

Fault Detection and Isolation (FDI)
Fault Tolerant Control (FTC)

Verification & Validation

Aerospace Systems





Dr. Andrés Marcos Esteban
Beatriz Galindo Senior Distinguished Investigator
UC3M-SENER Aerospace Chair & ST3LLAR Space lab Director

Past & Current PhDs (indicated number publications and awards during PhD time)

Mr. Diego Navarro-Tapia, UoBristol
June 2015 → graduated Jun 2019
ESA-NPI "VEGAdapt" – Robust Control for Launchers (ascent)

1 journal (plus 3 more published after defence)
11 conferences
Finalist IFAC Young Award ROCOND 2018

Mr. Andrea Iannelli, UoBristol
October 2015 → graduated Jun 2019
H2020 FLEXOP - Robust Control for Flutter (UAV)

5 journals (plus 5 more published after defence)
15 conferences (plus 1 more after defence)
Nominated Engineering PhD Excellence Award 2019

Mr. Pedro Simplício, UoBristol
April 2016 → graduated Oct 2019
UK Space NTSP2 – Robust Control Exploration Spacecraft
ESA-NPI TAILOR – Advance Reusable Launcher G&C (descent)

7 journals (plus 2 more published after defence)
9 conferences (plus 1 more after defence)
Best Student Award EUCASS'19
Nominated Engineering PhD Excellence Award 2020

Mrs. Alison Ponche, UoBristol & UC3M
Jan 2019 → *Expected Dec 2022*
AIRBUS-Germany – Robust modeling & control spacecraft

1 journal submitted
2 conferences
Best PhD UKACC Poster Award 2019

Dr. Andrés Marcos Esteban
Beatriz Galindo Senior Distinguished Investigator
UC3M-SENER Aerospace Chair & ST3LLAR Space lab Director

uc3m PHD

Aerospace

Open PhD Opportunities

Current (As Soon As possible)

1. **PhD Candidate: "Robust & Machine Learning System Identification Techniques for Aerospace Systems"**

   Funded by a CAM, potential collaborations with SENER (Madrid) & University of Michigan (US)

   Aim: to reconcile recent Machine Learning techniques with established Robust Control methods for system identification in aerospace applications (e.g. small satellites).

2. **Post-Doctoral Researcher: "Verification & Validation of AOCS/ADS Robust & Machine Learning Systems"**

   Funded by a CAM, **2.5 years**, potential collaborations with SENER (Madrid) & DLR-Bremen (Germany)

   Aim: (i) to develop and HIL-test V&V techniques for AOCS/ADS robust & machine learning systems; (ii) to support the development of a small satellite platform & mission at UC3M

In preparation (expected for Sept-Nov 2022)

3. **PhD Candidate: "Agile and Stable AOCS End-2-End Demonstrators"**

   Funded by Horizon European project, potential collaborations with SENER (Madrid)

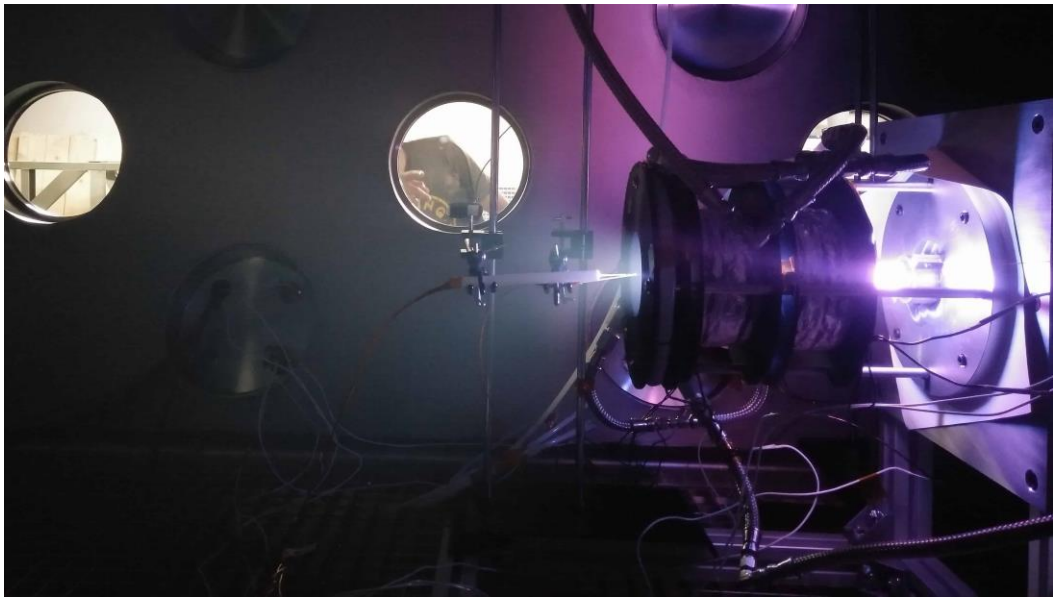
   Aim: to design and build E2E prototypes, including Digital Twins, for testing "agile" & "stability" AOCS schemes

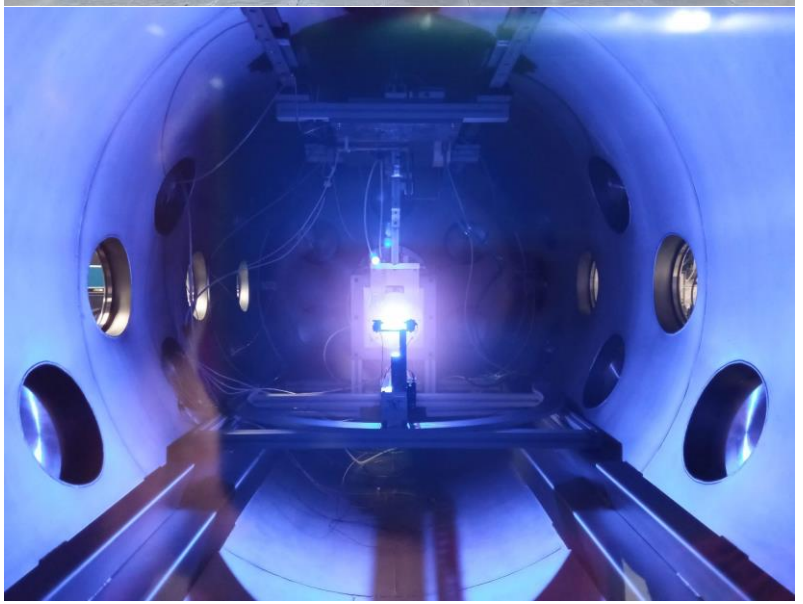
PhD opportunities at the Plasmas and Space Propulsion Team

Aerospace PhD Open Day
2022-04-20

Numerical and experimental research on space plasma thrusters

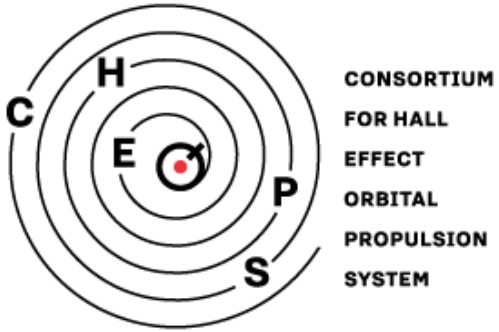
- Only research group in Spain dedicated entirely to electric propulsion
- 30 years, 20+ researchers
- Durable national & international collaborations with main players in electric propulsion





EP2's research projects

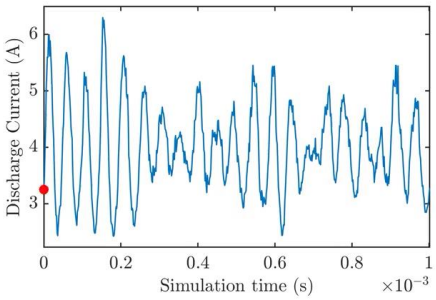
Learn more at: https://ep2.uc3m.es/

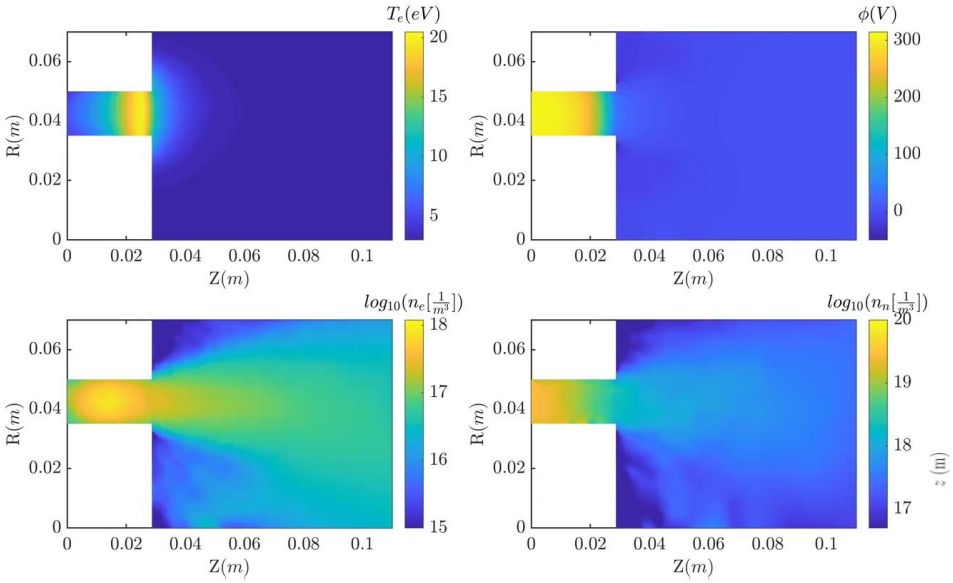


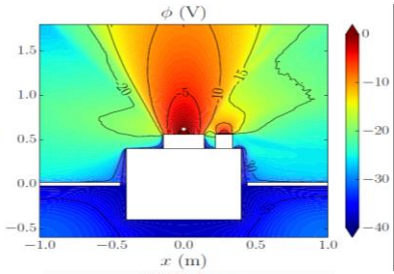
Simulation of Plasma thruster physics

- Top-class Particle-in-Cell codes and multi-fluid codes developed in house:
  - Analysis of plasma transport in Hall thrusters, instabilities, oscillations…

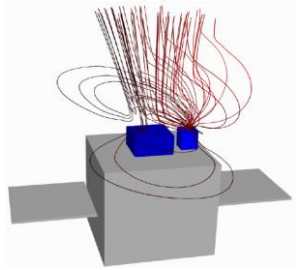
H2020-CHEOPS





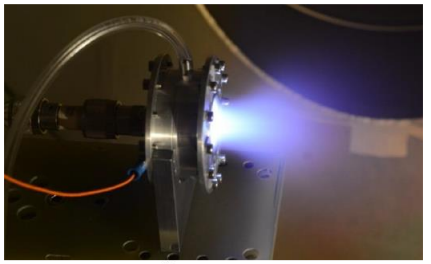


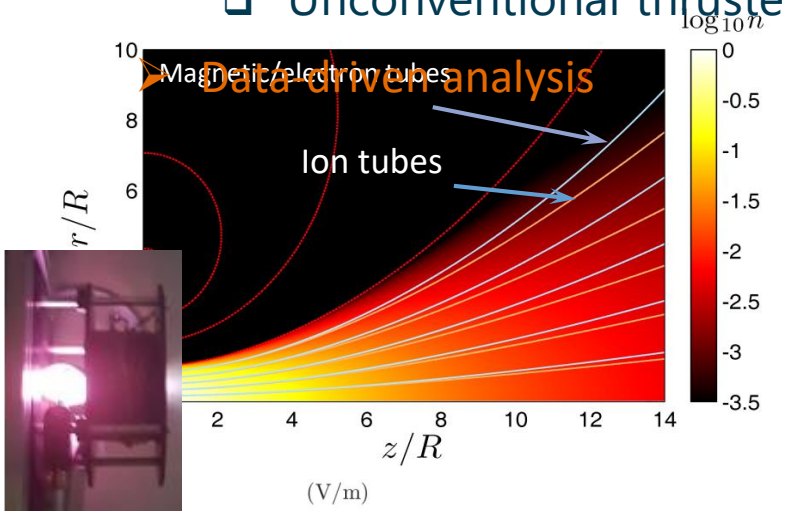
- 3D Plasma plume expansion:
  - Neutralization process
  - Interaction with spacecraft surfaces

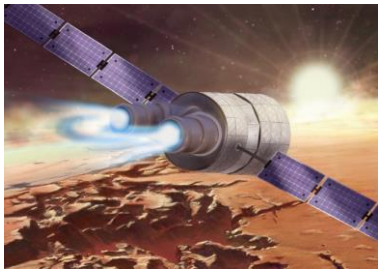


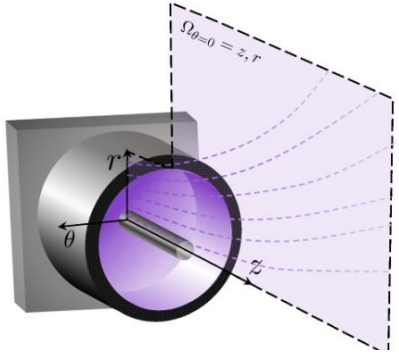
Simulation of Plasma thruster physics

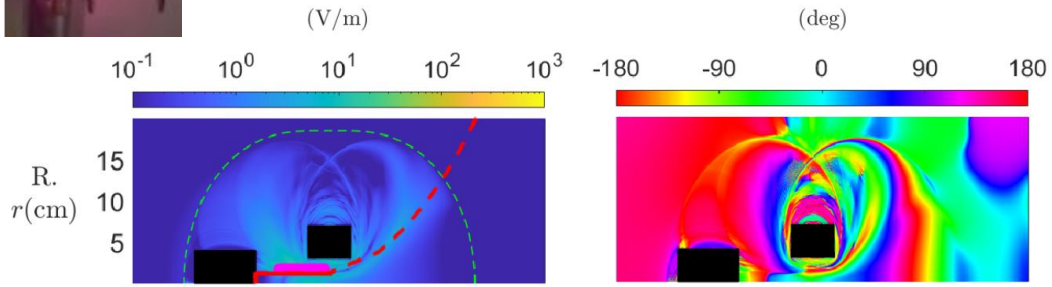
- Electrodeless plasma thruster numerical simulation
  - Magnetic nozzle kinetics
  - Plasma transport and electromagnetic waves coupling
  - Unconventional thruster configurations

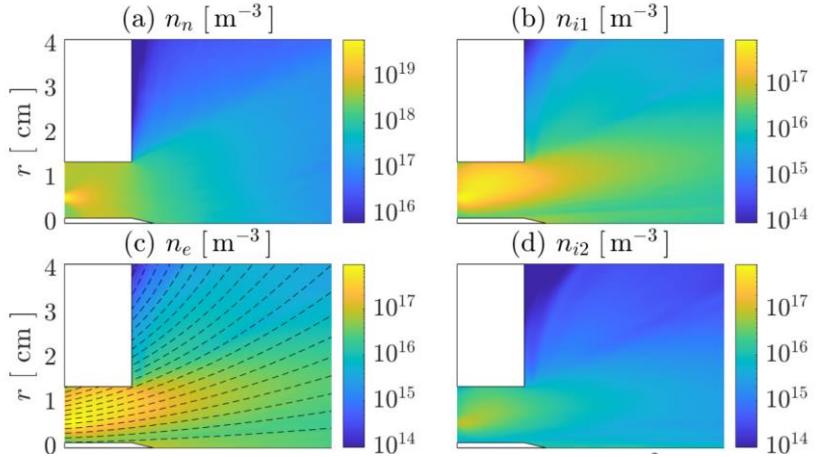






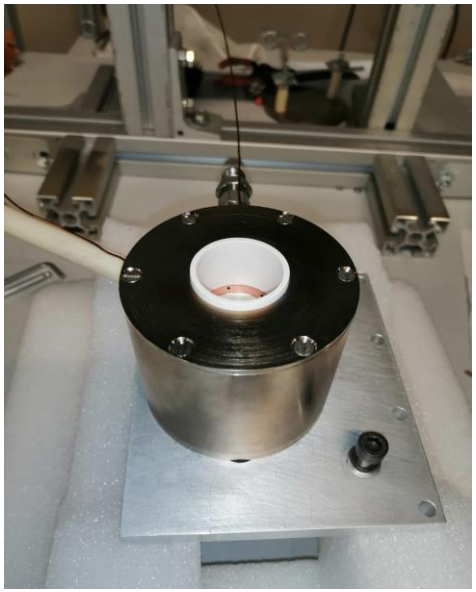


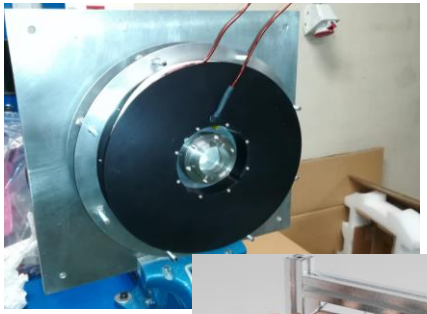


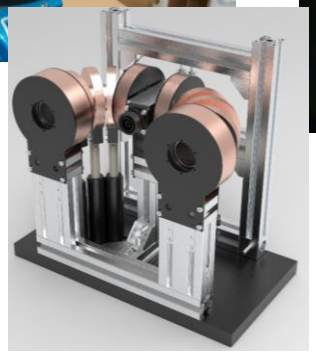


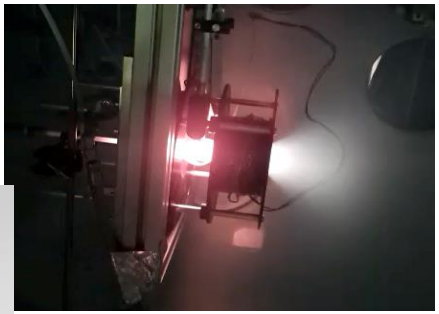
Plasma laboratory

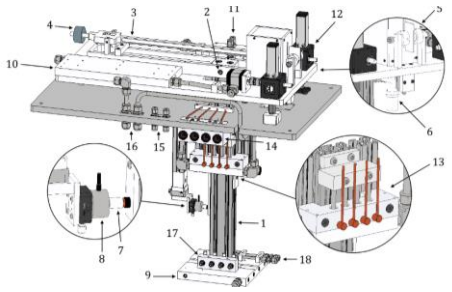
- Unique-in-its-class vacuum chamber and plasma diagnostic systems
- In-house development of
  - Helicon plasma thrusters
  - Electron-cyclotron thrusters
  - Hall thrusters
  - Magnetic-arch thruster

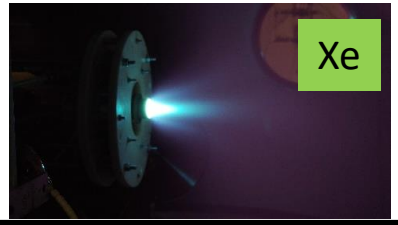


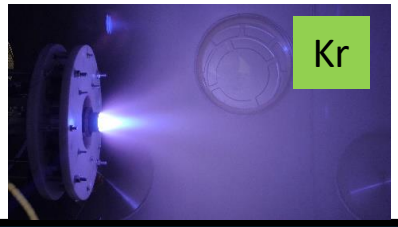










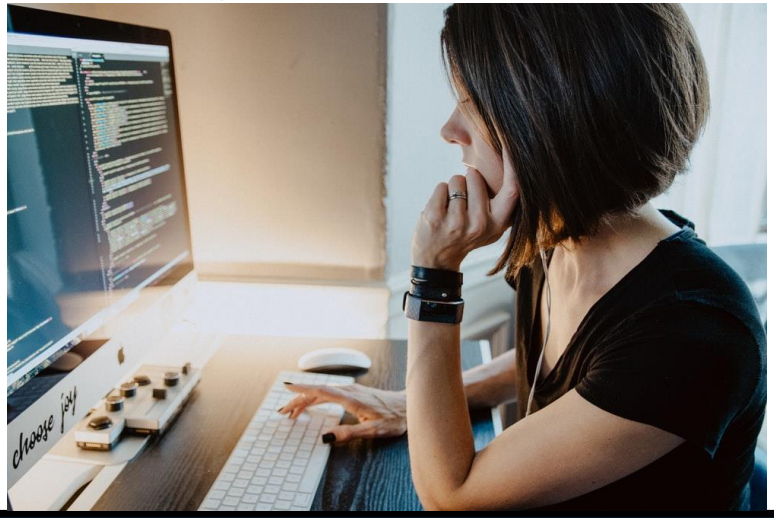


Open PhD Positions 2022-2023

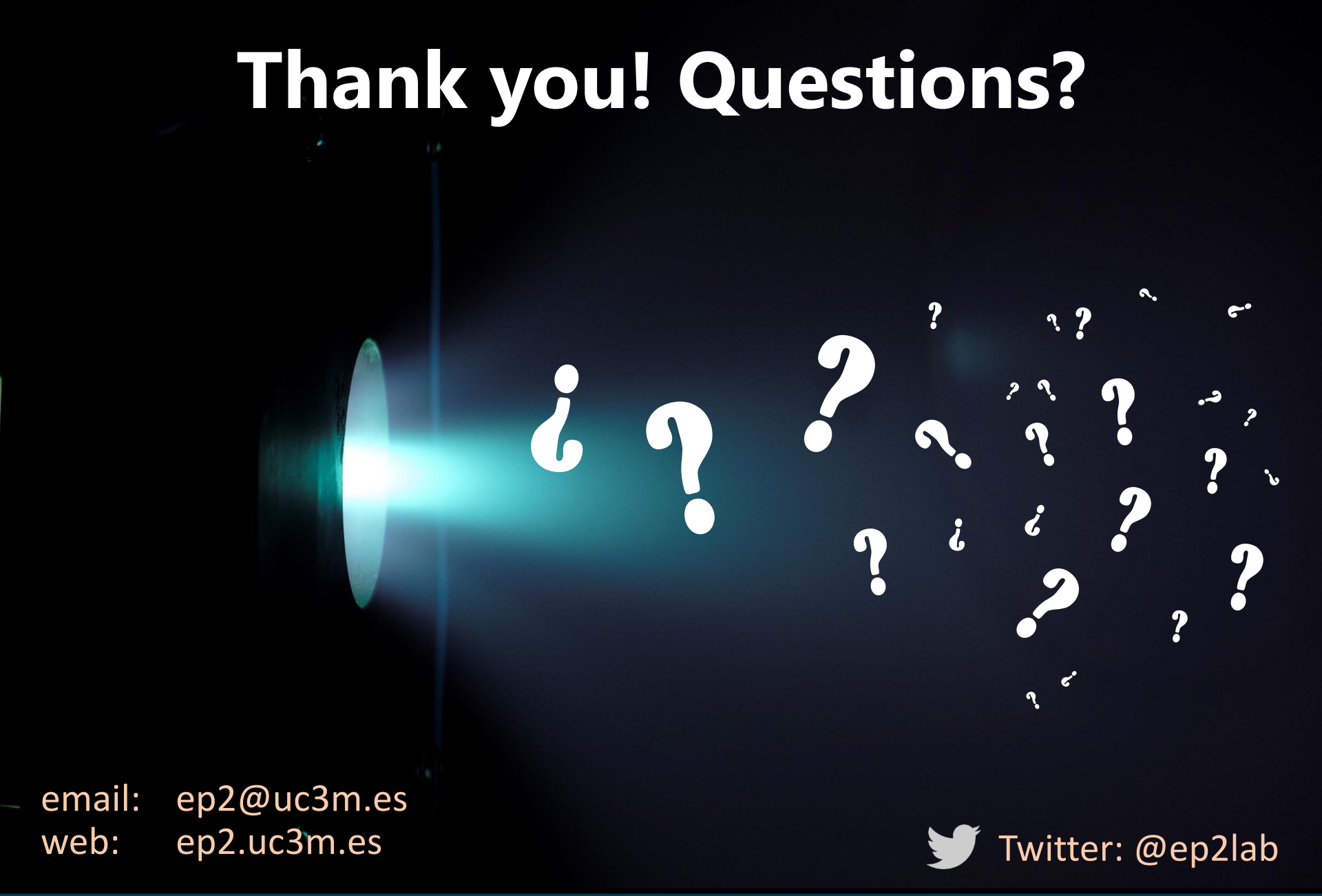
- Advanced modeling of magnetic nozzles and electrodeless thrusters
  - Collisional effects, demagnetization, induced B-field effects
  - Global stability analysis
- Numerical simulation of the novel MagArch thruster
  - Fluid-fluid modeling of the plasma generation and transport in the source
  - 3D propagation and absorption of electromagnetic waves in the plasma
- Data-driven reduced-order modeling and control of plasma thrusters
  - POD & friends, ROM techniques, neural network autoencoders
- Instabilities and anomalous transport
- Modeling ion thrusters and hollow cathodes
- Fluid-kinetic modeling of new Hall thruster designs
- Advanced diagnostics and analysis for plasma thrusters
  - Laser-based, probe based, others
- Development of low-mid power electric propulsion subsystems

We want you!

- Sought profiles:
  - Great academic record
  - Strong background in math, physics
  - Responsible, autonomous & team player
- Numerical simulation:
  - Disciplined programming in Python, Matlab, Fortran
- Experimental work:
  - Design + procurement + build + test + postproc skills



Thank you! Questions?



email: ep2@uc3m.es
web: ep2.uc3m.es

Twitter: @ep2lab

Agenda

- Welcome to UC3M
- Description of the PhD Program
- Aerospace Engineering Research lines and PhD Positions
- **Industrial Doctorates and Institutional Cooperations**
- Questions and Open Discussion
- Networking Lunch

Industrial & Institutional

Student
- Pelayo Peñarroya Rodríguez

Student
- Alejandro Cano Sánchez

Students
- Francisco de Borja de Saavedra
- Giuseppe Di Pasquale
- David Villegas Prados

Student
- Sergio García Gonzales
- Victor Gómez García

Student
- Guillermo Escribano

Student
- Pelayo Vázquez Rodríguez

Student
- Manuel Angel Sánchez Piedra

Industrial Doctorates - CAM

Comunidad de Madrid | Dirección General de Investigación e Innovación Tecnológica
CONSEJERÍA DE EDUCACIÓN, UNIVERSIDADES, CIENCIA Y PORTAVOCÍA

ORDEN 3247/2021, de 2 de noviembre, del Consejero de Educación , Universidades, Ciencia y Portavoz del Gobierno, por la que se aprueba el Plan Estratégico para la realización de Programas de fomento de la I+D+i empresarial en la Comunidad de Madrid 2022-2024.

https://mcyt.educa.madrid.org/convocatorias

"Ayudas para la realización de doctorados industrials". Expected 1st Term 2022

LÍNEA	6. Ayudas para la realización de doctorados industriales
OBJETO	- Promover la colaboración efectiva y la transferencia de conocimientos entre el mundo académico y el mundo empresarial. - Potenciar la captación de jóvenes investigadores para que desarrollen proyectos de investigación en las empresas que los contraten y que les permita la obtención de un doctorado industrial. - Posibilitar la incorporación profesional de estos jóvenes doctores a las empresas una vez finalicen la ayuda. - Fortalecer las líneas de investigación y la competitividad de las empresas madrileñas para desarrollar proyectos industriales junto con las Universidades, Organismos Públicos de Investigación o las Fundaciones hospitalarias.
BENEFICIARIOS	Las entidades beneficiarias de las ayudas serán una del entorno académico (Universidades, Hospitales o centros de Investigación) y una empresa pública o privada.
CONCEPTOS SUSCEPTIBLES DE AYUDA	Tendrán consideración de gastos subvencionables: - Financiación para el entorno académico: coste de matrícula, contratación de personal, adquisición de equipamiento y material fungible, viajes y dietas y otros gastos relacionados con el proyecto de doctorado industrial. - Financiación para el entorno empresarial: El coste mínimo del contrato del doctorando industrial.
PLAZO DE EJECUCIÓN	Las ayudas serán para un periodo máximo de tres años.
PROCEDIMIENTO CONCESIÓN	Concurrencia competitiva, de tal forma que la concesión de las ayudas se realizará mediante la comparación de las solicitudes presentadas con objeto de establecer una prelación entre las mismas de acuerdo con unos criterios de valoración previamente fijados y se adjudicará la subvención a aquellas solicitudes que hayan obtenido mayor puntuación.
COSTES PRESUPUESTARIOS PREVISIBLES	Respecto a su impacto presupuestario, se prevé disponer de un crédito de 7.500.000 € por convocatoria, repartido en tres anualidades, cuya financiación se realizará con cargo al subconcepto 78200 del Programa 466A "Investigación" del presupuesto general de la Comunidad de Madrid.
FUENTE FINANCIACIÓN	100% Comunidad de Madrid.
INDICADORES	Nº de doctorandos contratados.

Ayudas para contratos para la formación de investigadores en empresas (Doctorados Industriales) 2021

GOBIERNO DE ESPAÑA
MINISTERIO DE CIENCIA E INNOVACIÓN

Plan Estatal de Investigación Científica y Técnica y de Innovación 2021-2023

https://www.aei.gob.es/convocatorias/buscador-convocatorias/ayudas-contratos-formacion-investigadores-empresas-16

La Agencia Estatal de Investigación publica cada año una convocatoria de Doctorados Industriales para promover la formación de doctores en empresas a nivel estatal mediante la cofinanciación de los contratos pre-doctorales que participen en un proyecto de investigación industrial o experimental desarrollado en la empresa, en el que se enmarcará su tesis doctoral, a fin de favorecer la inserción laboral de investigadores en las empresas desde el inicio de sus carreras profesionales.

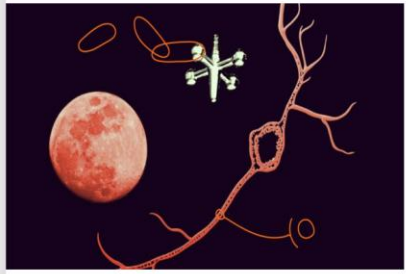
Estado: cerrada
Plazo de solicitud: 24/02/2022
Objetivo: Desarrollo de proyectos de doctorados industriales en cualquier ámbito de conocimiento y en cualquier sector empresarial.
Tipo de proyecto: proyectos de investigación industrial o de desarrollo experimental, que den lugar a una tesis doctoral en temas de interés y relevancia para la empresa, cuatro años de duración.
Beneficiarios: empresas (pequeña, mediana y grande) y solicitante matriculada/o o admitida/o en un programa de doctorado.
Tipo de ayuda/gastos financiables: subvención de hasta el 70%, dependiendo del tamaño de la empresa y del tipo de proyecto, para financiar el contrato predoctoral, realización de estancias y gastos de matrícula.
Más información: aquí (convocatoria 2022)

Industrial Doctorates at EU

Doctoral Networks

European Commission

Marie Skłodowska-Curie Actions
Developing talents, advancing research



Doctoral Networks call schedule

- The most recent call for this action is **now closed.**
- The next call will open in **Spring 2022.**

Find out What's New

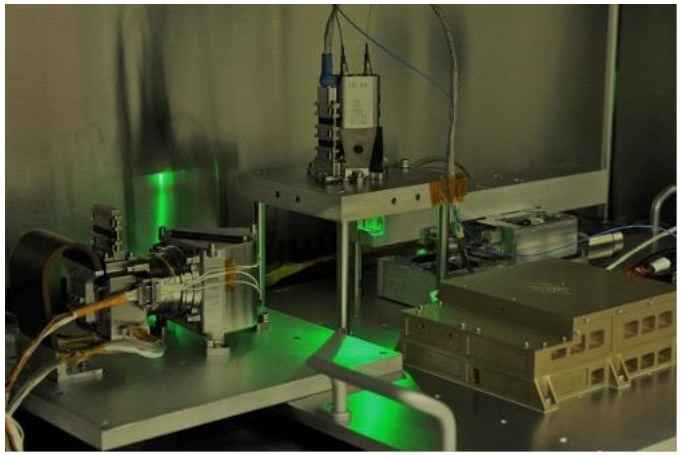
Types of Doctoral Networks
Doctoral Networks implement doctoral programmes, by partnerships of universities, research institutions and infrastructures, businesses including SMEs, and other socio-economic actors from different countries across Europe and beyond. These doctoral programmes will respond to well-identified needs in various research and innovation areas, expose the researchers to the academic and non-academic sectors, and offer research training, as well as transferable skills and competences relevant for innovation and long-term employability.
Besides standard Doctoral Networks, incentives have been introduced to promote two specific types of doctorates as well.

1. Industrial Doctorates. They train PhD candidates who wish develop their skills and step outside academia, in particular in industry and business. Individual participants must be enrolled in a doctoral programme and jointly supervised by the academic and non-academic partners.
2.Joint Doctorates. They provide a highly integrated type of international, inter-sectoral and interdisciplinary collaboration in doctoral training leading to a joint doctoral degree or multiple doctoral degrees awarded by the participating institutions. PhD candidates must be enrolled in a joint programme and be jointly supervised.

Institutional Cooperation PHD

GOBIERNO DE ESPAÑA
MINISTERIO DE DEFENSA
SECRETARIA DE ESTADO DE DEFENSA
INTA Instituto Nacional de Técnica Aeroespacial

CORRECCIÓN DE LA CONVOCATORIA DEL PROCESO SELECTIVO PARA LA COBERTURA DE 25 PLAZAS DEL GRUPO PROFESIONAL M3 MEDIANTE LA MODALIDAD ESPECÍFICA DE CONTRATO PREDOCTORAL DE PERSONAL INVESTIGADOR EN FORMACIÓN, CONFORME AL ARTÍCULO 21 DE LA LEY 14/2011, DE 1 DE JUNIO, DE LA CIENCIA, LA TECNOLOGÍA Y LA INNOVACIÓN, SUJETO AL CONVENIO ÚNICO PARA EL PERSONAL LABORAL DE LA ADMINISTRACIÓN GENERAL DEL ESTADO EN EL INTA.



Open PhD (full time) position

in Guidance, Navigation & Control

Navigation Laboratory is looking for Young and ambitious researchers, who will study how to navigate in extreme environments **(rockets or electronic warfare scenarios among others)**

- A major focus is the GNSS-SDR devices (Satellite Navigation with Software Defined Radio), that allowed highly specific and versatile algorithms.
- Work is developed in both HW and SW sides, as the power of this technology emerges from their intimate relation.

Technical background eould required programming skills (C, MATLAB) and digital or RF electronics knowledge (or interest)

If interested in this position, send CV, motivation letter and the name of one referee to: **gomezlma@inta.es**

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