

IFCAE NEWS

INSTITUTE OF PHYSICS AND AEROSPACE SCIENCES OF THE UNIVERSITY OF VIGO

VII Dissemination Conference on Science, Technology, Engineering and Mathematics: eXXperiment in feminine

On February 16, the VII Dissemination Conference on Science, Technology, Engineering and Mathematics: eXXperiment in feminine, took place. The event, held in the Polytechnic Building on the Ourense campus, consisted of a series of scientific demonstrations throughout fourteen stands occupied mostly by women belonging to the research area. Among the numerous attendees were more than 300 secondary and high school students from eight schools in Ourense and Lugo, who were able to meet in person female references in the areas of mathematics, engineering, physics and technology.

The various positions that made up the dissemination day, chaired by female research staff from the Faculty of Sciences, the School of Aeronautical and Space Engineering, the School of Computer Engineering and the University School of Nursing on the Ourense campus, offered students a broad vision of the relevant role of women in the world of research. One of the objectives of this activity, which was also open to the general public, was to attract female vocations to a world mostly occupied by men, a challenge assumed by Julia Carballo, Alma Gómez and Nieves Lorenzo, who carried out the task of coordinating the event.

The students, among other activities, were able to discover the importance of biomass, see what the microorganisms in water are like, create a rainbow and learn about the origin of clouds and tornadoes, in addition to having the opportunity to put on spaceship simulation glasses and learn to create small video games. In addition, the event also included other activities, such as teaching first aids, disseminating the power of enzymes and knowledge of the second life of waste, with forensic physics also present along with alchemy, a food label reading workshop and an escape room set in a biorefinery.



Students at the entrance to the Polytechnic Building.



Students in one of the stands of the event.



Stands dedicated to the physics and aerospace sectors.



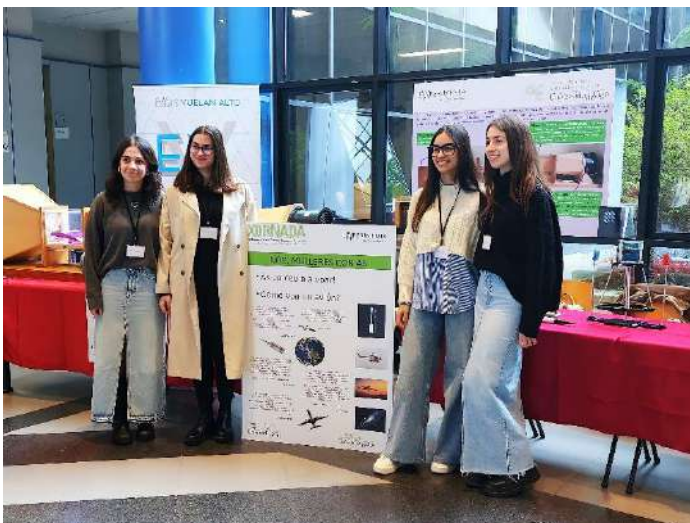
Virtual reality area.



Demonstration of the operation of a wind tunnel.



Students participating in a question & answer contest.



Some of the female researchers who took part in the event.



Alma Gómez and Nieves Lorenzo, coordinators of the event.

Four new projects for IFCAE

Two IFCAE members have achieved a total of four projects. Higinio González Jorge has obtained the leadership of the autonomous robotics project for construction, rehabilitation and maintenance in buildings, while Elena Beatriz Martín Ortega leads three projects: two for the company CIE GALFOR, S. A. and a third consisting on an access to the Spanish Supercomputing Network (RES), which comprises a total of 1,789 kh of computing with priority access to the CIEMAT/XULA cluster.



Higinio González Jorge.



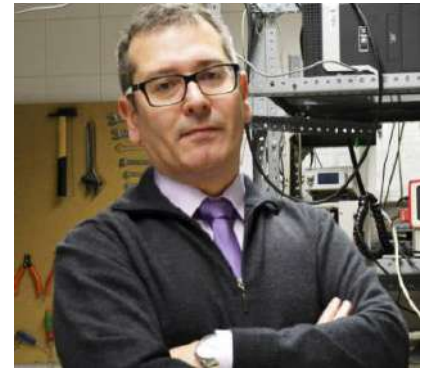
Elena Beatriz Martín Ortega.

Discovery of a new type of physical structure

Ángel Paredes Galán and Humberto Javier Michinel Álvarez, IFCAE researchers, have discovered a new physical structure: self-trapped vortex crystals.



Ángel Paredes Galán.



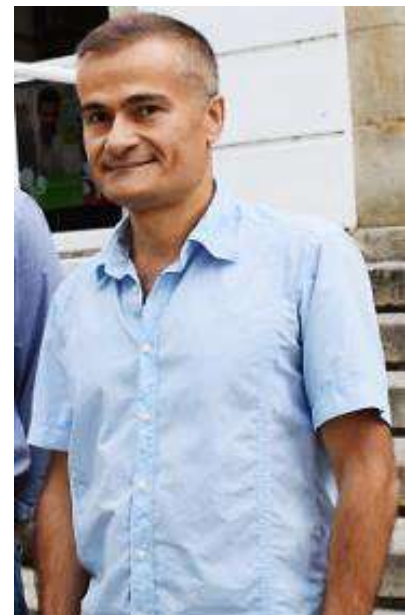
Humberto Javier Michinel Álvarez.

IFCAE researchers design sustainable flights to Mars

Marco Casanova Álvarez and Daniele Tommasini, IFCAE researchers, have demonstrated together with Fermín Navarro the feasibility of traveling to Mars using solar electric propulsion instead of chemical propulsion, a finding that has been echoed by two prestigious research blogs: Phys.org and Universetoday.com.



Marco Casanova Álvarez.



Daniele Tommasini.

Kick-off meeting of the national structured light network FASLIGHT

In January, the kick-off meeting of the national structured light network FASLIGHT took place in Salamanca. FASLIGHT includes 15 national universities, including the University of Vigo, represented at the meeting by Ángel Paredes and Humberto Michel.



Attendees at the FASLIGHT kick-off meeting.

Three awards for the aeronautical sector

The second edition of the business ideas competition in air traffic management (Crida), organized by the Ministry of Transport, has awarded three proposals made by researchers and graduates of the Ourense campus. These three proposals also won the three first prizes in the first phase of the competition and, as finalists of the contest, they will go on to compete for the final prize, worth 10,000 euros. The first prize (5000 euros) went to Gabriel Alejandro Pérez, graduate of the School of Aeronautical and Space Engineering of the University of Vigo; the second (3000 euros) for the research staff of the Lia2 group of the Higher School of Computer Engineering; and the third (1000 euros) for Alberto Rodríguez, graduate of the School of Aeronautical Engineering.



School of Aeronautical and Space Engineering.

Results in perspective

Commentary on "Feasibility study of a Solar Electric Propulsion mission to Mars" by Marco Casanova Álva-rez *, Fermín Navarro Medina and Daniele Tommasini *.

*IFCAE members

<https://doi.org/10.1016/j.actaastro.2024.01.001>

This work presents the feasibility study of a mission to Mars using solar electric propulsion. In contrast to chemical propulsion, which is the propulsion method traditionally used in space, in which a combustion reaction is generated, electric propulsion bases its thrust on the acceleration and ejection of electrons, typically using a noble gas as a propellant. This technology generates a much smaller force, but with much lower consumption. The low order of magnitude of thrust generated (500 mN for the most powerful) restricts its use to long time periods instead of the impulsive maneuvers that chemical propulsion allows, given its high thrust.

This technology, which is booming in commercial Earth observation satellites and for geostationary satellites, is also beginning to be decisive in interplanetary missions since it opens the door to new types of trajectories, not contemplated with chemical propulsion. Our work compares the initial masses that would be needed to carry out a scientific mission to a polar orbit around Mars at just 300 km altitude using a chemical or an electrical system. Once the superiority of the electrical system has been demonstrated, our study presents a complete preliminary design of the electric propulsion satellite capable of carrying out the mission, presenting the necessary power, mass or equipment requirements. This mission concept can serve as a basis for future missions as it demonstrates the advantages of this system compared to previous missions to the Red Planet.

