



PRESS RELEASE

The largest mapping of the Cosmos begins

It will observe hundreds of millions of galaxies from the Observatorio Astrofísico de Javalambre in order to understand the accelerating expansion of the Universe.

18 October, 2023.- The Observatorio Astrofísico de Javalambre (OAJ) has started to take the first data from the Javalambre Physics of the Accelerating Universe Astrophysical Survey (J-PAS), a major and unprecedented three-dimensional mapping of the cosmos, which is planned to be carried out during the current decade.

J-PAS will observe thousands of square degrees of sky visible from Javalambre and map hundreds of millions of galaxies and stars, with the ultimate goal of advancing the understanding of the nature of dark energy by studying the large-scale structure of the Universe.

The project, led by the Centro de Estudios de Física del Cosmos de Aragón (CEFCA), together with the Instituto de Astrofísica de Andalucía (IAA-CSIC), the Observatorio Nacional de Rio de Janeiro and the University of Sao Paulo, is developed and scientifically exploited through an international collaboration with more than 250 researchers from 18 countries.

J-PAS is the main project to be carried out with the JST250, the Javalambre's large field-of-view 2.5m telescope, and the JPCam panoramic camera which, with more than 1.2 billion pixels, is currently the second largest astronomical camera in the world. In addition, JPCam integrates 56 worldwide unique photometric filters defined specifically for the project, allowing to provide multi-colour images of large areas of the sky and ultimately obtain spectral information for all objects in the field of view. All this makes the JPCam-JST250 "tandem" a superb machine suited for mapping the Universe and measuring extragalactic distances with the precision needed for cosmological purposes.

The first J-PAS observations come after an arduous process of verification, fine tuning and optimisation of JPCam at JST250, carried out by a team of CEFCA researchers, engineers and technicians. In spring 2023, the last phase of commissioning began, which was recently successfully concluded after confirming that the JPCam-JST250 system meets and even overcomes the scientific-technical requirements initially foreseen. In particular, its excellent image quality over the entire field of view is remarkable. Dr. Antonio Marín, deputy director of OAJ and head of the JPCam project at CEFCA, explains: *"JPCam is a prototype, in the sense that there is no other camera like it in the world. The 14 large-format CCD detectors that are integrated in the instrument were developed specifically for this project, as well as its complex control electronics and the J-PAS filter system itself"*. He adds: *"Due to its very high technological complexity, the characterisation, validation and final commissioning of JPCam has been a challenge that has required new engineering developments during the commissioning phase"*.



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So far, the first 15 square degrees of the mapping with the 56 J-PAS filters have been observed (equivalent to an area of 60 full moons). Although this is only the beginning, the data already include information for a million stars and galaxies.

Due to the large field of view of JST250, each JPCam image occupies approximately 1 GB, and hundreds of images can be taken each observing night. The large volume of data generated by J-PAS makes the OAJ to have a specific data center for the storage, management and calibration of scientific data.

"The start of the J-PAS data acquisition is a very special moment as we are applying our multidisciplinary knowledge and experience from other OAJ surveys precursors to J-PAS to ensure both the efficiency of the astronomical observations and the proper processing of the huge amount of images involved," says Dr. Héctor Vázquez, head of CEFCa's Data Processing and Archiving Department. "CEFCa's goal is always to provide the scientific community with data of the highest possible quality in order to contribute to the advancement of knowledge," he concludes.

J-PAS is a legacy project for the international scientific community that is set to provide a unique view of the Universe. Both in terms of the type and the amount of information that it will provide for each of the hundreds of millions of astronomical objects that will systematically observe, it opens up new challenges in almost every field of astrophysics.

Dr Carlos López San Juan, deputy director of Science at CEFCa, says *"The history of astronomy teaches us that large astronomical surveys conducted in the past represented new milestones in our knowledge of the Cosmos. J-PAS will be the largest and most accurate multi-colour photometric survey able to provide spectral information for any region of the Universe. As such, it aspires to become a benchmark for astronomy in the 21st century."*

The J-PAS project was the scientific driving force for the definition and construction of the OAJ which, since 2014, belongs to the map of Unique Science and Technology Infrastructures (ICTS) of the Ministry of Science and Innovation. With the start up of JPCam, the OAJ ICTS is now fully operational. The beginning of J-PAS is also a fundamental milestone in the project "Advanced technologies for the exploration of the Universe and its components" of the Complementary Plans with Autonomous Communities which, within the area of Astrophysics and High Energy Physics, is jointly executed by Andalusia, Aragon, the Balearic Islands, Cantabria, Catalonia, Madrid and the Valencian Community with co-financing from the Recovery, Transformation and Resilience Plan, financed by the European Union - NextGenerationEU. CEFCa coordinates this project in Aragon and relies on the Teruel Investment Fund to co-finance R&D&I activities related to JPCam and J-PAS.

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J-PAS website:

<https://www.j-pas.org/>

Notes to editors

About CEFCa and OAJ



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The Centro de Estudios de Física del Cosmos de Aragón (CEFCA) is an astrophysics research institute of the Government of Aragon founded in 2008 and located in Teruel. Its activities are focused on the development, operation and scientific exploitation of the Observatorio Astrofísico de Javalambre (OAJ), an astronomical Unique Science and Technology Infrastructure (ICTS) equipped with two telescopes specially designed to carry out large-scale mapping of the sky, unique in the world. The CEFCA is mainly participated by the Government of Aragon and the Ministry of Science and Innovation, and constitutes an Associated Unit of the CSIC with the Instituto de Astrofísica de Andalucía.

The OAJ and the J-PAS Project are funded by CEFCA and by the Governments of Aragon and Spain through the Fondo de Inversiones de Teruel, European Regional Development Funds, the Recovery, Transformation and Resilience Plan (NextGenerationEU) from the Spanish Ministry of Science and Innovation and the Spanish State Research Agency. The Brazilian agencies FINEP, FAPESP, FAPERJ and the National Observatory of Brazil have contributed to the funding of JPCam. Additional funding for J-PAS was provided by the Estonian Tartu Observatory and by the J-PAS Chinese Astronomical Consortium.

[CEFCA website](#)

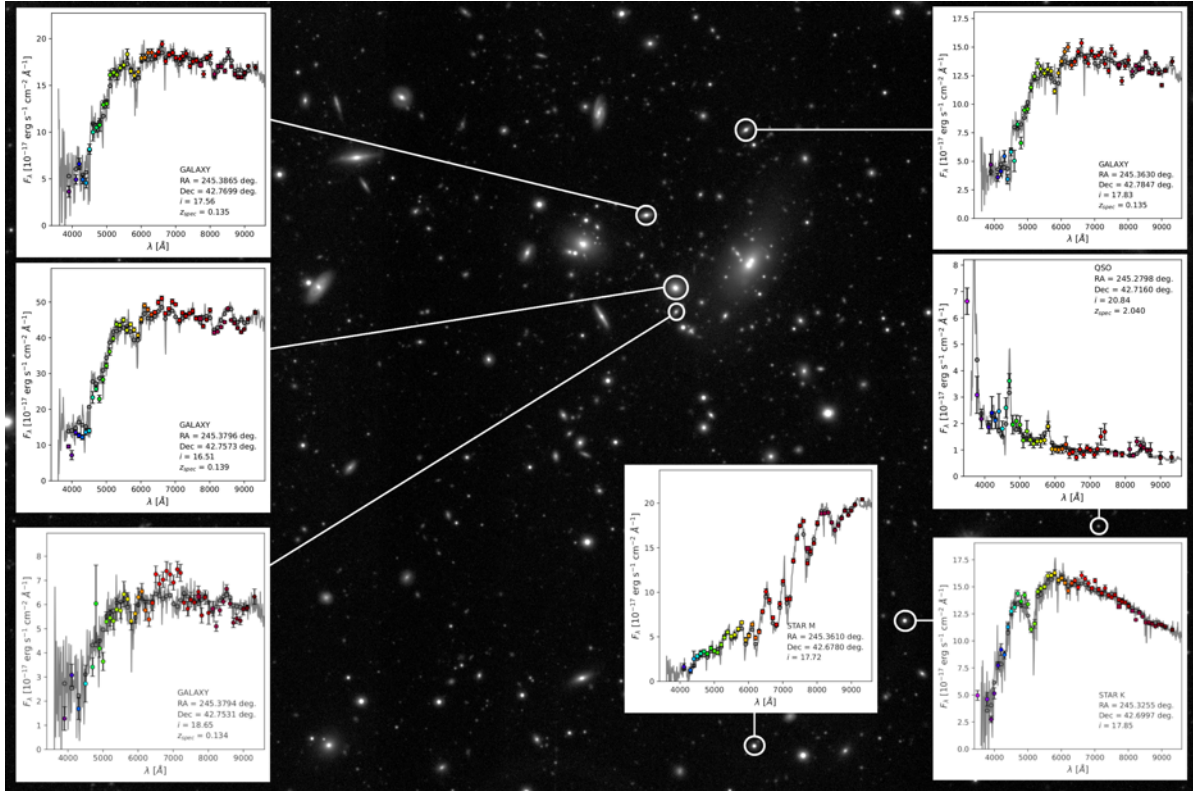
About ICTS

Unique Science and Technology Infrastructure (ICTS) are large facilities, resources, equipment and services, unique in their kind, which are dedicated to cutting-edge research and technological development of the highest quality, as well as to promoting the transmission, exchange and preservation of knowledge, technology transfer and innovation.

ICTS are unique or exceptional of their kind, and their importance and strategic nature justifies their availability to the entire R&D&I community. ICTS have three fundamental characteristics: they are publicly owned infrastructures, they are unique and they are open to competitive access.

[ICTS webpage](#)

Images:



Comparative image of preliminary J-PAS data with available spectroscopic data. The background image is a small region of one of the J-PAS exposures. The plots present the J-PAS data in each of the 56 filters (in colour) against available spectra (in grey) of several galaxies, two stars and a quasar. Image credit: Centro de Estudios de Física del Cosmos de Aragón (CEFC).



Javalambre Survey Telescope (JST250) of the Observatorio Astrofísico de Javalambre, and its scientific instrument JPCam. Image credit: Centro de Estudios de Física del Cosmos de Aragón (CEFC).

Aragón (CEFCa).

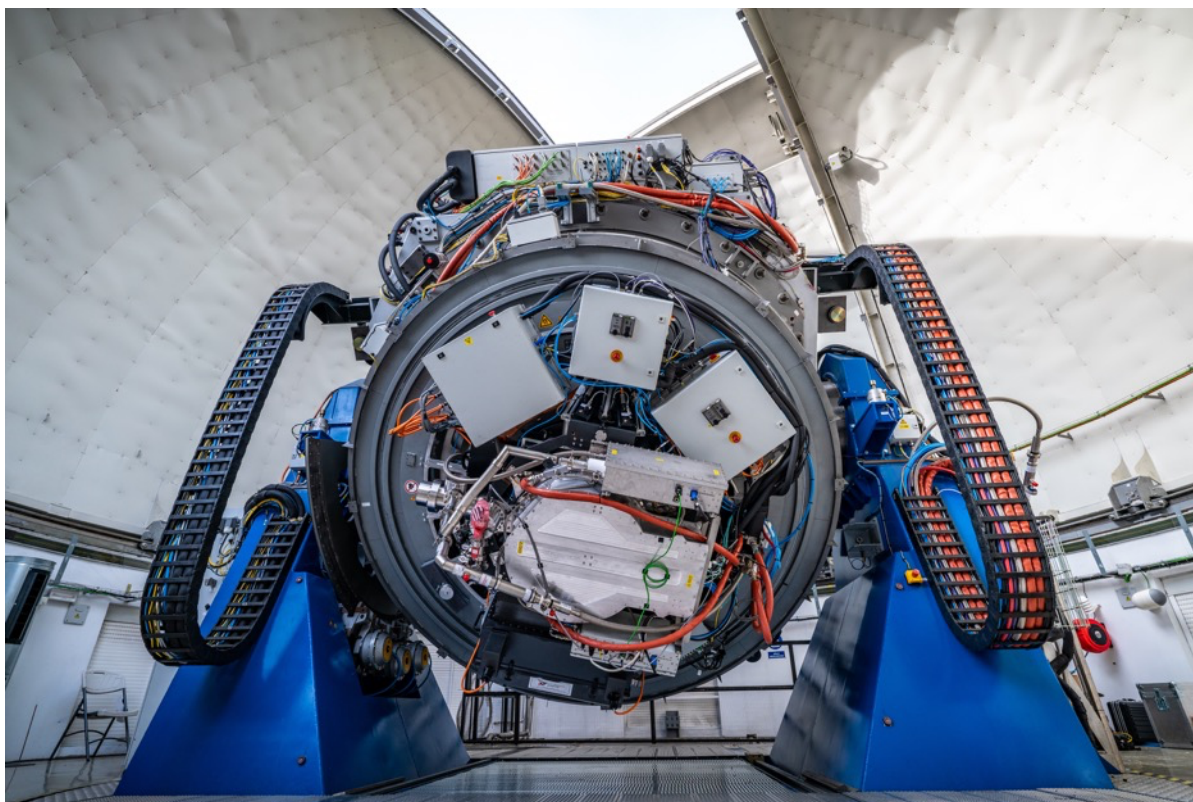


Image of the JPCam camera installed on the Javalambre Survey Telescope (JST250) of the Observatorio Astrofísico de Javalambre (OAJ). Image credit: Centro de Estudios de Física del Cosmos de Aragón (CEFCa).