The international J-PAS collaboration releases the first data from the survey of the Universe

The Javalambre Physics of the Accelerating Universe Astrophysical Survey (J-PAS) project is making available to the scientific community the first 12 square degrees of the three-dimensional map of the Universe that it is carrying out from the Javalambre Astrophysical Observatory. The area studied contains 550,000 astronomical objects and is only a small sample of the full survey area, which will observe thousands of square degrees over 10 years.

The first images and catalogues of this international project are, as of today, 20 November, fully accessible through the website https://archive.cefca.es/catalogues/jpas-edr/. The first survey data show the three-dimensional position of 100,000 stars and some 450,000 galaxies. It is the first scientific demonstration of the power of the combination of the JST250 wide-field telescope and its JPCam panoramic camera.

An unprecedented map

The J-PAS mapping is the result of a unique combination: observing a large volume of the Universe in an unprecedented number of photometric bands. The JPCam camera integrates 56 narrow-band optical filters, unique on the international level and specifically defined for the project. In practice, this means having homogeneous multi-colour information of all observed objects. This makes it possible to determine astrophysical quantities such as the temperature and composition of stars or the age and distance of galaxies, among many others.

J-PAS is set to become the most complete photometric mapping of the Universe, as well as an international reference for a multitude of scientific applications. It will observe thousands of square degrees of the sky with hundreds of millions of galaxies and stars. ‘Any future study of these objects will benefit from the information provided by J-PAS. As a legacy project, we believe that J-PAS will become one of the major international references in astrophysics over the next decade. And this release is the first step on this path,’ says Dr Carlos López San Juan, deputy scientific director of CEFCA.

Information in every pixel

J-PAS now opens access to the data corresponding to a total of 12 square degrees with the 56 filters of the project. The data set consists of 25,000 images that have been obtained over the last year. The J-PAS images are unique in that they provide information in all filters, but also in all pixels of the observed area. The images themselves are calibrated, which means that the light intensity can be measured at any point of any survey, in the 56 filters.

Hundreds of images are taken every night from the Javalambre Astrophysical Observatory (OAJ), which also require a dedicated data centre for their storage,

management and calibration. The development of image processing tools is another milestone of the J-PAS project.

For Renato Dupke of the National Observatory of Brazil: ‘Not only does it have the unique potential to do unique science, which other mapping cannot do, but it will also link to other scientific collaborations and projects that are being developed today.

One of the world's largest cameras

The J-PAS project began taking the first scientific images about a year ago. J-PAS is the main project carried out with the JST250 telescope, a 2.5 meter wide-angle telescope at the Javalambre Astrophysical Observatory (OAJ). Its scientific instrument is the Javalambre Panoramic Camera (JPCam) which, with more than 1.2 billion pixels, is currently one of the largest astronomical cameras in the world. The combination of JPCam and JST250 provides a uniquely powerful tool capable of mapping the Universe and measuring extragalactic distances with precision.

The international collaboration

J-PAS is managed through an international scientific collaboration. It is led by the Centro de Estudios de Física del Cosmos de Aragón (CEFCA) and the Instituto de Astrofísica de Andalucía (IAA-CSIC), in Spain, and by the National Observatory of Rio de Janeiro and the University of Sao Paulo, in Brazil, and is developed and scientifically exploited through an international collaboration with more than 250 researchers from 18 countries.

J-PAS is a legacy project for the international scientific community that will offer a unique view of the Universe, both in terms of the type and the amount of information it will provide for each and every one of the hundreds of millions of astronomical objects it will systematically observe. For Dr Héctor Vazquez Ramió, ‘the most important thing is that this early release gives a measure of what J-PAS can provide and the quality of these data. In many cases and scientific projects, you already have a rough idea of how far it can go.

The OAJ and the J-PAS Project are funded by the CEFCA and by the Governments of Aragon and Spain through the Teruel Investment Fund, the European Union within the framework of the Recovery, Transformation and Resilience Plan (NextGenerationEU) and the European Regional Development Funds. The Brazilian agencies FINEP, FAPESP, FAPERJ and the National Observatory of Brazil have contributed to the funding of JPCam. Additional funding for J-PAS has been provided by the Estonian Tartu Observatory and the Chinese J-PAS Astronomical Consortium.