

Observatorio Astrofísico de Javalambre
Call for Proposals
Semester 2021A



Proposals are expected to be submitted via:

<http://oaj.cefca.es/>

by 15 September 2020 at 23:59 CET.

1 Announcement of Opportunity

The Observatorio Astrofísico de Javalambre (OAJ) opens the **Call for Proposals** for semester **2021A (1st January 2021 - 30th June 2021)**.

Proposals are due by 15 September 2020 at 23:59 CET

2 Introduction

The OAJ (<http://oaj.cefca.es>), located at the Sierra de Javalambre, in Teruel (Spain), is aimed to lead large-sky multi-filter surveys of the Northern hemisphere over the next years. The OAJ consists of two main telescopes of large field of view (FoV): the 2.5m Javalambre Survey Telescope (JST/T250) and the 80cm Javalambre Auxiliary Survey Telescope (JAST/T80), with polychromatic, seeing-limited images in their unobscured FoVs of 7 deg^2 and 3 deg^2 , respectively. Both telescopes are equipped with panoramic instrumentation: JPCam, with $\sim 1.2 \text{ Gpix}$ distributed in a mosaic of 14 large-format CCDs covering 4.7 deg^2 at the JST/T250 focal plane and T80Cam, at the JAST/T80 telescope, providing a 2 deg^2 FoV at the focal plane. A specific data center for the reduction and archiving of the large volume of data acquired at the OAJ (up to 1.5 TB per night when the two telescopes are in operation) completes the main OAJ infrastructures. It deploys a storage capacity of more than 5 PBs and a computing power of 450 cores with 3.5 TB RAM memory.

JST/T250 will be devoted to conduct the Javalambre Physics of the Accelerating Universe Astrophysical Survey (J-PAS; <http://www.j-pas.org>), mapping 8500 deg^2 of the sky with a set of 54 narrow-band contiguous optical filters plus 5 broader ones. JPCam was attached to the JST/T250 in February 2020 and the J-PAS survey is planned to start by the second half of the same year.

JAST/T80 is currently mostly devoted to conduct the Javalambre Photometric Local Universe Survey (J-PLUS; <http://www.j-plus.es>), with 12 narrow, intermediate and broad-band filters. J-PLUS survey started in November 2015 and released the first $\sim 1020 \text{ deg}^2$ of data through the DR1 by July 2018. In 2020 a new data release (DR2) is scheduled with more than 2000 deg^2 of data (<https://archive.cefca.es/catalogues>).

Both J-PAS and J-PLUS will provide powerful 3D views of the Universe and unprecedented multicolor information for many fields of the Astrophysics that will be made publicly available to the community as legacy projects.

Since September 2014, the OAJ was included in the Spanish map of Infraestructuras Científicas y Técnicas Singulares (ICTS). As such, the OAJ offers 20% of Open Time to the astronomical community. This document describes the observing time offered by the OAJ in semester 2021A, the proposal submission process, the available instrumentation and related information of interest

for the observer.

3 Available Instrumentation

The instrumentation available for semester 2021A is T80Cam at the JAST/T80 telescope.

3.1 JAST/T80

The JAST/T80 telescope is an 80cm Ritchey-Chrétien-like telescope, with a German equatorial mount and a corrector of three spherical lenses. The secondary mirror (M2) is held by an hexapod, which is used to correct for optical aberrations of the system during operation. This is done by wavefront curvature sensing techniques developed at CEFCA, making use of intra- and extra-focal images. Because of the large FoV and fast optics (F#4.5) of the telescope, this process is required to keep the optimal image quality all across the FoV over time. In normal operation, the position and tilt of M2 are fine tuned according to an empirically calibrated control law for the hexapod, that takes into account the pointing coordinates and the temperature of the telescope.

A software limit is set at 25 deg elevation, below which observations cannot be performed. The absolute pointing accuracy is ~ 4 arcsec (rms) in the whole sky. Differential pointing inside a radius of 2 deg can be performed with an accuracy of ~ 0.6 arcsec (rms). Non-sidereal tracking capabilities are available.

3.1.1 T80Cam

T80Cam is the panoramic camera on the JAST/T80. It is a wide field camera with a $9.2k \times 9.2k$ pixels CCD, which provides a 2 deg^2 (unvignetted) FoV. The pixel scale is 0.55 arcsec/pixel.

For this call, **the only available mode of the CCD is “mode 05”**, with the following characteristics:

Readout noise	$3.4e^-$
Gain	Normal
Binning	1×1
Readout time	12.0s

For operational reasons, **the longest integration time offered for a single exposure is 600 s.**

T80Cam is equipped with the J-PLUS filters. These are 4 SDSS filters (g, r, i, z), the u_{Java} , and seven narrow band filters, as illustrated in Figure 1. Table 1

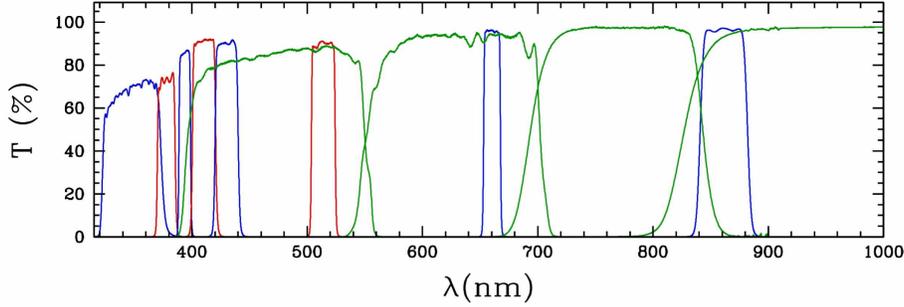


Figure 1: The measured transmission curves of the J-PLUS filters mounted on T80Cam

ID	Name	CW (nm)	FWHM (nm)	Comments
01	u_{Java}	348.5	50.8	In common with J-PAS
02	J0378	378.5	16.8	[OII]; in common with J-PAS
03	J0395	395.0	10.0	Ca H+K
04	J0410	410.0	20.0	H δ
05	J0430	430.0	20.0	G-band
06	Sloan- g	480.3	140.9	SDSS
07	J0515	515.0	20.0	Mgb Triplet
08	Sloan- r	625.4	138.8	SDSS
09	J0660	660.0	14.5	H α ; in common with J-PAS
10	Sloan- i	766.8	153.5	SDSS
11	J0861	861.0	40.0	Ca Triplet
12	Sloan- z	911.4	140.9	SDSS

Table 1: Main characteristics of the J-PLUS filters mounted on T80Cam.

summarizes the characteristics of the filters. If a project require filters which are different from the ones offered, the PI should contact the OAJ in advance.

3.1.2 Status

JAST/T80 and T80Cam are performing as expected within requirements without significant issues. Note, however, that the T80Cam@JAST/T80 system, the OAJ, and their control infrastructures have not reached their maximum efficiency yet. The CEFCA staff is continuously developing and implementing upgrades of the system to optimize the overall performances.

4 Proposing for Semester 2021A

4.1 Proposal Types

The OAJ Open Time is split in two semesters as given below:

- **Semester A:** January 1st - June 30th
- **Semester B:** July 1st - December 31st

As commented before, the OAJ as ICTS offers 20% of Open Time to the astronomical community. Usually, this 20% of the time amounts a total of 308 hours split in three types of programs. From this 308 hours, 268 h are assigned to Regular and Large Programs and the remaining 40 hours devoted to the Director Discretionary Time. However, since some programs have been assigned for several semesters, in this semester 2021A the time assigned for Regular and Large programs will be just 128 hours.

Program	Time by proposal	Total time offered
<i>Regular program</i>	less than 48 h	128 h
<i>Large program</i>	at least 48 h	
<i>Director Discretionary time</i>	at most 40 h	40 h

Table 2: Programs properties.

- **OAJ Regular Programmes (OAJ-RPs)** are defined as short observing projects that require **no more than 48 h/semester**. These projects are expected to benefit from the large FoV and/or the unique filter set of the OAJ telescopes. OAJ-RPs are evaluated by the OAJ Time Allocation Committee (OAJ-TAC).
- **OAJ Large Programmes (OAJ-LPs)** are defined as long observing projects that exploit the large FoV and the unique filter set of the OAJ telescopes to conduct small or intermediate-size surveys that require, **at least, 48 h/semester**. OAJ-LP proposal shall demonstrate the scientific and technical capabilities of the research team to handle and analyze the large volume of data gathered by the program as well as to publish the results in due time. OAJ-LPs are evaluated by the OAJ-TAC. If the requested time exceeds this limit the time can be distributed in up to 4 semesters.
- **OAJ Director Discretionary Time (OAJ-DDT)**, up to 40 h/semester. OAJ-DDT proposals are reserved for testing the feasibility of potential future observing cases of great scientific impact, for the follow-up of objects in which a quick response is key for the scientific return, or for unexpected events. OAJ-DDT proposals are evaluated by an internal committee chaired by the Director of CEFCA.

Targets of opportunity (“ToO”) are welcome and, depending on the scientific requirements and merit (as evaluated by the OAJ-TAC), can be guaranteed “override” status (i.e. can interrupt the execution of another observation in the queue). In case a ToO is not granted “override” status, it will be executed as soon as possible.

Filler programs are also welcome. A filler program is defined as a project which can be executed with any type of weather constraints and its scientific outcome does not require completion.

In case that the time allocated for OAJ-RP or OAJ-LP projects is not awarded completely (either due to a scarcity of proposals or to their unfeasibility and/or low quality), the OAJ-TAC may decide to move this time to OAJ-DDT or the J-PLUS/J-PAS time in the ratio decided by the OAJ-TAC.

For **OAJ-LPs awarded for multiple semesters** or an OAJ-LP being awarded in successive semesters, a report is required. This report, will contain the status and the outcome of the awarded observations. The report should be sent to oaj-support_at_cefca.es by October 15th for projects observed in semester 2020A and with time awarded at 2020B who want to continue in 2021A. The OAJ-TAC will consider this report to assess the continuity of the proposal.

Large program reports are due by 15 October 2020 at 23:59 CET

4.2 Access to the OAJ Open Time

OAJ proposals are directed to researchers from institutions from all over the world. A proposal can have up to two Principal Investigators (PIs). While OAJ-DDT proposals can be requested at any time, the opening and deadlines of the call for proposals for OAJ-RPs and OAJ-LPs in each semester are:

- **Semester A:** Opening: August 1st; Deadline: September 15th.
- **Semester B:** Opening: February 1st; Deadline: March 15th.

4.3 Observing at the OAJ

In semester 2021A proposals are executed in queue mode. The visitor mode can be considered upon request depending on the available resources and logistics at the OAJ.

All RPs and LPs are split in 1:2:1 ratio of Dark:Grey:Bright time conditions. In the Fig.2 is shown the fraction of time requested for the different transparency type and night brightness conditions in both semesters A and B. Whenever possible, we encourage the users to consider less restrictive observing conditions for a higher success rate of their proposals.

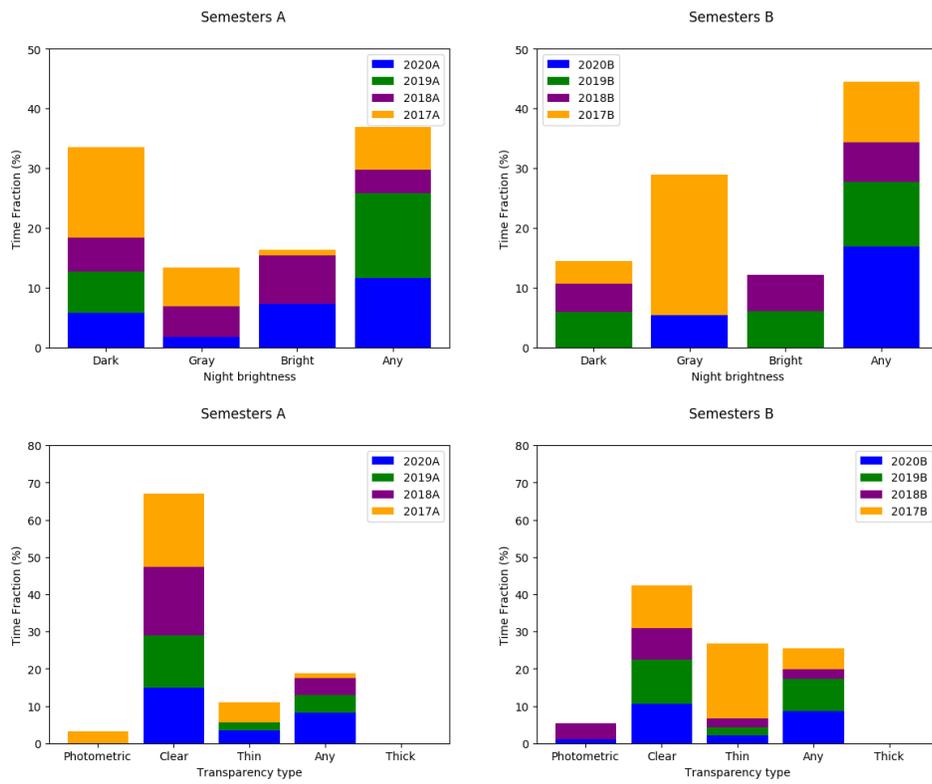


Figure 2: The different types of night brightness and sky transparency requested for semesters A and B.

4.4 Oversubscription at OAJ

The mean oversubscription fraction (RPs and LPs) in all the semesters is around 1.16. The mean number of proposals in the same period are 7 (RPs) and 2 (LPs).

4.5 Data Products

The data collected at the OAJ as part of an Open Time proposal will be provided to the contact person indicated in the proposal form through the OAJ-TACData webportal. The delivered data account for:

- The raw scientific data
- Calibration frames (bias/darks/flatfields)
- The scientific data reduced in a standard way with the most-recent OAJ pipelines developed by the CEFCA team for each instrument.

OAJ guarantees the storage of this data, which will be available once the raw images have been processed by the pipeline and validated at CEFCA.

CEFCA staff is continuously developing and implementing upgrades of the system to optimize the overall performances. Although we will try to notify important upgrades, take into account that the reduction pipeline may change and the offered processed data may be updated without prior notice. If you think this can be critical for your project, we encourage you to keep track of the data versions.

Pre-reduced data can be provided upon request which must be scientifically justified during the observations' preparation phase.

After a proprietary time of one year, the data will be made public through the OAJ External Data Access Machine.

Additional support regarding the data could be provided by the OAJ staff on a best-effort basis. In case it is needed, please, contact oj-upad@cefca.es.

4.6 Calibrations

The calibrations, which are taken as part of the standard calibration plan at the OAJ are:

- Bias
- Sky flats

- Illumination correction observations
- OAJ spectrophotometric standard stars

In case a user requires specific calibration frames, the observing time will be charged as part of the proposal.

4.7 Submission Procedure

Proposals should be submitted in electronic form via:

<http://oaj.cefca.es/>.

Both PIs and their collaborators must register to the website.

Anyone can create a proposal and the proposals can be edited until the deadline. If the proposal does not have all the required information, it is marked as “incomplete”. The web form will provide feedback on the missing information.

Once the proposal is “complete”, the PI can submit it. If a complete proposal has not been submitted by the deadline, it is considered submitted by default. If a proposal is not complete by the deadline, it is not submitted.

The web form should include the requested pointings as well as the exposure times. An estimate of the overheads (pointing, instrument setup, readout time and observation of standard stars) is already included in the automatic calculation of the total requested time. Overheads already include the average time spent in running the wavefront curvature sensing algorithms and applying the M2 hexapod control law to optimise the image quality all over the entire FoV of T80Cam.

4.8 Publications

You can find a list of all publications which were made using OAJ facilities at:

<http://oajweb.cefca.es/publications/publications>.

If you have already observed at OAJ and you are publishing a paper, we encourage you to inform us at oaj-support_at_cefca.es and we will post a link to your paper at our web page.

Should you have questions, contact oaj-support_at_cefca.es