

Observatorio Astrofísico de Javalambre  
Call for Proposals  
Semester 2017B



Proposals are expected to be submitted via:

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

by 15 March, 2017 at 23:59 CET.

# 1 Announcement of Opportunity

The Observatorio Astrofísico de Javalambre (OAJ) opens the **Call for Proposals** for semester **2017B (1st July 2017 - 31st December 2017)**.

**Proposals are due by 15 March, 2017 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  $7 \text{ deg}^2$  and  $3 \text{ deg}^2$ , respectively. Both telescopes are equipped with panoramic instrumentation: JPCam<sup>1</sup>, with  $\sim 1.2 \text{ Gpix}$  distributed in a mosaic of 14 large-format CCDs covering  $4.7 \text{ deg}^2$  at the JST/T250 focal plane, T80Cam, at the JAST/T80 telescope, providing a  $2 \text{ deg}^2$  FoV at the focal plane, and JPAS-PF, a replica of T80Cam with modified optics to be installed at the JST/T250 telescope before the arrival of JPCam. 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.

During the first years of operation, the OAJ telescopes and cameras will be mostly devoted to conduct the Javalambre Physics of the Accelerating Universe Astrophysical Survey (J-PAS; <http://www.j-pas.org>; 2017 – 2024), mapping  $8500 \text{ deg}^2$  of the sky with a set of 54 narrow-band contiguous optical filters plus 5 broader ones, and the Javalambre Photometric Local Universe Survey (J-PLUS; <http://www.j-plus.es>; 2016–2020), covering the same J-PAS sky area with 12 narrow, intermediate and broad-band filters aimed to provide the photometric calibration of J-PAS. 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.

This document describes the observing time offered by the OAJ in semester 2017B, the proposal submission process, the available instrumentation and related information of interest for the observer.

<sup>1</sup>JPCam arrived at the OAJ on Oct13, 2016 and it should be installed on JST/T250 along the second half of 2017

## 2.1 Available Instrumentation

The instrumentation available for semester 2017B is T80Cam at the JAST/T80 telescope.

### 2.1.1 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 a 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 18 deg elevation, below which observations cannot be performed. The absolute pointing accuracy is  $\sim 4$  arcsec (rms) in the whole sky. Differential pointing inside a radius of 2 deg can be performed with an accuracy of  $\sim 0.6$  arcsec (rms). Non-sidereal tracking capabilities are available.

### 2.1.2 T80Cam

T80Cam is the panoramic camera on the JAST/T80. It is a wide field camera with a  $9.2\text{k} \times 9.2\text{k}$  pixels CCD, which provides a  $2 \text{ deg}^2$  (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       | $1 \times 1$ |
| 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 (griz), the  $u_{\text{Java}}$ , and seven narrow band filters, as illustrated in Figure 1. Table1 summarizes the characteristics of the filters. Should a project require filters which are different from the ones offered, the PI should contact the OAJ in advance.

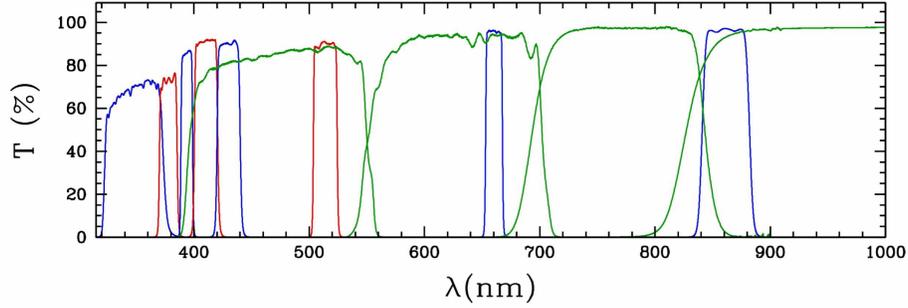


Figure 1: The measured transmission curves of the J-PLUS filters mounted on T80Cam

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

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

### 2.1.3 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.

## 3 Proposing for Semester 2017B

### 3.1 Proposal Types

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

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

During 2017B it is planned to perform extraordinary maintenance with JAST/T80 which is expected to last about one month. The amount of offered time is re-scaled accordingly.

Three different categories of Open Time are defined:

- **OAJ Regular Programmes (OAJ-RPs)**, up to 100 h/semester. OAJ-RPs are defined as short observing projects that require no more than 40 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)**, up to 123 h/semester in 2017B and 148h in following semesters. 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, 40 h/semester in semester 2017B and 48h in following ones. The requested time can be distributed in up to 4 semesters. OAJ-LP proposal shall demonstrate the scientific and technical capabilities of the research team to handle and analyze the large volumen of data gathered by the program as well as to publish the results in due time. OAJ-LPs are evaluated by the OAJ-TAC.
- **OAJ Director Discretionary Time (OAJ-DDT)**, up to 33 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.

All the different categories of Open Time are split in the same 10:20:10 ratio of Dark:Gray:Bright time conditions.

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 any other category with overpressure of high quality proposals. Otherwise, this time will be moved to the OAJ-DDT and the J-PLUS/J-PAS time in the ratio decided by the OAJ-TAC.

### **3.2 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). At least one PI must belong to a Spanish institution.

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.

OAJ-DDT proposals can be requested at any time.

### **3.3 Observing at the OAJ**

In Semester 2017B proposals are executed in queue mode. The visitor mode can be considered upon request depending on the available resources and logistics at the OAJ.

### **3.4 Oversubscription at OAJ**

The oversubscription rate, for RPs, has been 1.68 and 1.59 for semesters 2016B and 2017A, respectively. For the same semesters, the oversubscription rate for LPs has been of 0.79 and 1.98, respectively.

As mentioned in Section 3.1, RPs are allocated in a 10:20:10 ratio, hence, during semesters 2016B and 2017A there were 30, 60, 30 hours available in dark, grey

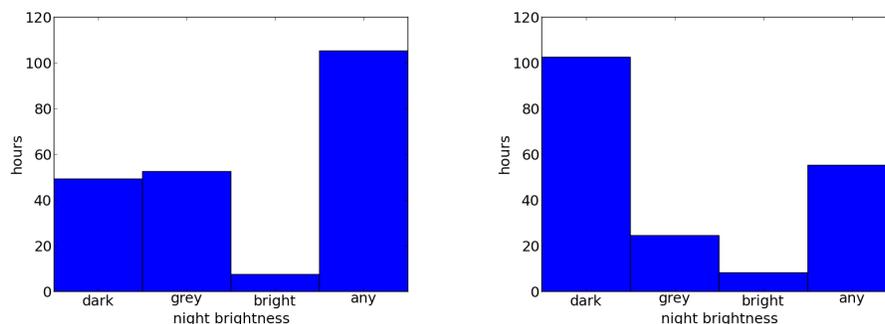


Figure 2: In the left panel, the amount of hours requested in the different types of night brightness in semester 2016B (the peak for “any” type of night is mostly due to ToO and variability monitoring programs. In the right panel, the same plot for semester 2017A.

and bright time, respectively. During the first two calls for proposals, it became clear that there is higher pressure on dark and photometric/clear nights (see Fig.2). Whenever possible, we encourage the users to consider less restrictive observing conditions for a higher success rate of their proposals.

As it can be seen from Fig.3, during the semester 2016B some ranges of right ascension were clearly on higher demand than others. This situation improved significantly in semester 2017A.

### 3.5 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, once the observations are concluded and validated by CEFCA. 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 the raw and calibration data. The reduced data will only be available during a month. After this period, they will be removed and can be recovered with the most recent version of the pipeline. Additional support could be provided by the OAJ staff on a best-effort basis. In case it is needed, please, contact [oaj-upad\\_at\\_cefca.es](mailto:oaj-upad_at_cefca.es).

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

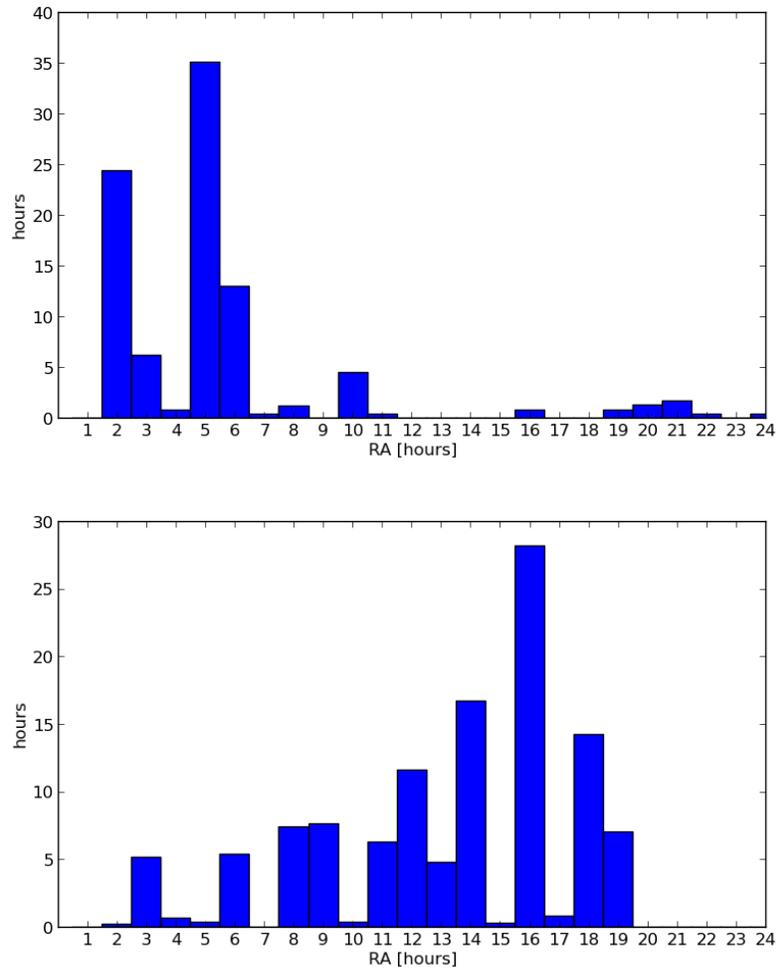


Figure 3: In the upper panel, the time requested distributed in the different intervals of right ascension for period 2016B. In the lower panel, the same plot for period 2017A. Note that, for obvious reasons, ToO programs are not included in this plot.

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

### 3.6 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.

### 3.7 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 webform 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 webform 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.

Should you have questions, contact Alessandro Ederoclite ([aederocl.at.cefca.es](mailto:aederocl.at.cefca.es))