Platospec Preoject Management Plan

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Prepared by : [redacted]
Contributed by : [redacted]

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Content

1.0 Purpose of the document

This document presents an overview on PLATOSpec project and a description of management processes and management structure.

2.0 PLATOSPec project overview, aims and goals

The aim of PLATOSPec is mainly the initial screening of transiting planetary candidates, the characterization of hot Jupiters/Neptunes, and outflows from exo-atmospheres. The PLATO mission requires more than 60 nights per year on 1-2 meter telescopes. Initial screening is a crucial first step in determining the nature of the candidate. By removing false positives it will save precious observing time on larger telescopes which can be devoted to observing the most promising low mass planet candidates.

Within the PLATOSPec project ESO's 1.52-m telescope at La Sillawill be refurbished and robotized, and the suhsequently a modern Echelle spectrograph will be installed and commissioned. In the long term, the facility will be devoted to ground-based support of the space mission PLATO. Our project will enable the institutes involved with this project to become official members of the PLATO team and to be key players in the PLATO follow-up.

The PLATOSPec instrument will consist of a stable state-of-the art high-resolution echelle spectrograph (resolving power, R = 70,000) which will achieve a radial velocity measurement precision of at least 3 m/s, for stars as faint as V=12. In addition, the spectrograph will extend to blue wavelengths (< 4000 Angstroms) in order to characterize atmospheric escape from planets and to monitor the stellar activity on Ca H and K lines. Basic parameters are listed in Table 1. For these studies the smaller aperture of the telescope will be compensated by the large amount of available observing time. Another important contribution will be our ability to confirm and characterize hot Jupiter planets and some Neptune-sized planets with the radial velocity method and to determine their physical parameters. Although these systems will be important for understanding the complete population of exoplanets, these objects will be largely ignored by larger telescopes which will be devoted to confirming the smallest planets. The facility is planned for operation in 2022 and we will start by contributing also to TESS space mission making us thus hetter prepared when PLATO comes on line. Naturally, additional scientific programs particularly those requiring long-term monitoring can also be pursued. The characteristics of the system will make our project unique and complementary to existing instrumentation such as HARPS or the EULER telescope. Our project will be operated by a consortium comprised of the Astronomical Institute of Czech Academy of Sciences, the Thüringer Landessternwarte Tautenburg and Universidad Catolica de Chile with contribution of additional partners such as the Astronomical Institute of Slovak Academy of Sciences and University of Graz who expressed their interest.

Table 1: Main paramateres of the spectrograph

Echelle spectrograph	Parameter value
Wavelength coverage	360-680 nm
Spectral resolution	70k
Thermal stability	0.1deg
RV accuracy	3m/s
Calibration	ThAr+Iodine cell

3.0 PLATOSPec schedule

Current schedule of PLATOSPec project is presented in Table 2. The project passed now its definition phase and the administrative phase. It was officially approved by the Astronomical Institute in 2018. The approval process consisted of independent reviews by anonymous referees. The reviews are archived and available upon request. Furthermore, based on the Science proposal for PLATOSPec, ESO made the recommendation to the ESO Council to approve the project also in 2018. The full text of ESO STC Recommendation could be found here:

http://www.eso.org/public/about-eso/committees/stc/stc-91st/public/STC_612_Hosted_Telescope_PLATOSpec_91st_STC_Mtg_April_2018.pdf

On the technical side, all conceptual designs were made for all parts of the project during 2018 and they are described in the following documents:

PLATOSpec document No. 6 - PLATOSpec Conceptual Design Study

Currently, we have defined requirements and concepts for the spectrograph, telescope, front end and fiber optics. The software requirements are defined as complying with ESO standards.

In 2018, the technical drawings and project documentation was performed for the telescope front end. In 2019, the project enters the fund raising phase and later in 2020 the construction phase.

The project should be operational in the course of 2022 or beginning of 2023. The PLATOSPec project should operate at least until 2033 (end of nominal PLATO mission phase) and if operating parties agree, then it shall operate beyond 2033.

Table 2	YEAR					
	2017	2018	2019	2020	2021	2022
PHASE	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4
Administrative	X X	X X X X				
Negotiation w ESO		X X	X X X			
Instrument design	X	X X X				
Funding proposals		X X X X	X X X X			
Instrument building				X X X X	X X X X	X X
Robotization/Dome				X X X X	X X X X	X
Commissioning					X	X X
Observing phase						X X

Table 2: PLATOSPec time line.

4.0 The PLATOSpec Consortium

4.1 General overview on the Consortium structure (The Consortium)

The project is led by Astronomical Institute of the Czech Academy of Sciences and it is conducted in collaboration with Thueringer Landessternwarte Tautenburg, Germany and Universidad Catolica de Chile, Chile as the PLATOSPec Consortium members (The Consortium). The Consortium is led by the PI and consists of the Consortium board consisting of up to two researchers per institute and chaired by the PI. The Consortium working order is regulated in the Memorandum of Understanding undersigned by each partner (TBC).

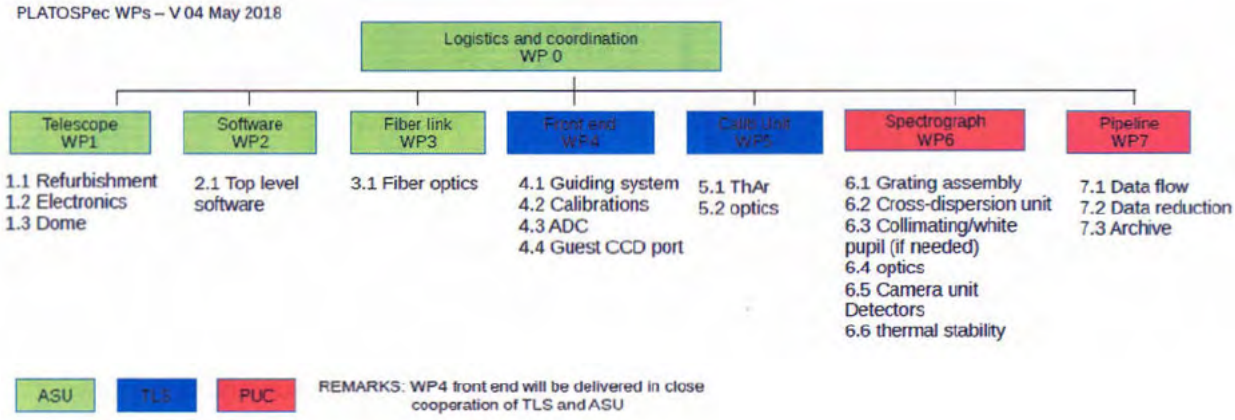

Figure 1: Work Packages of the PLATOSpec project.

4.2 Responsibilities of the partners

Each partner in the consortium contributes by equal share to the cost of the project. The contributions are divided into material costs, operating/commissioning costs and manpower costs. The provisional work packages (WPs) and their responsible partners are presented in Fig. 1.

Astronomical Institute of the Czech Academy of Sciences (AI ASCR)

The AI ASCR is the leading institute of the Consortium. The PI and main contact person from the AI ASCR is [redacted]. AI ASCR is coordinating the efforts to obtain the funding, building, commissioning and running of the spectrograph in the first phase.

AI ASCR maintains a PLATOSPec management team which currently includes [redacted] and [redacted]. The PLATOSPec management team is responsible for preparing of documentation for each phases of the project, for coordination of efforts between Consortium partners and for the meeting of the schedules and agreed time lines and delivery dates if possible.

AI ASCR is also responsible for communicating with European Southern Observatory (ESO) on behalf of the Consortium. Responsibilities of AI ASCR in this respect were to prepare and submit a documentation request by ESO to approve PLATOSPec project which was successfully recommended by ESO STC (Science Technical Committee) to the ESO Council in 2018. In the

current phase. AI ASCR will be negotiating the contract for the PLATOSPec operations at La Silla and the fees with ESO. All steps will have to be mutually agreed by the Consortium members.

AI ASCRs contribution shall be a refurbishment of the 1.52-m telescope and its preparation for the operational phase. The works would include the exchange of control software, tests and equipment of all necessary new components and systems. Furthermore, AI ASCR will be overseeing the refurbishment of the dome, if needed. The overall contribution should be 1/3 of the total cost of the project.

Deliverables: WP0, WP1, WP2, WP3

Thueringer Landessternwarte Tautenburg (TLS)

The TLS team is led by the PI Dr. Eike Guenther and consists of [redacted] and TBC members. The main responsibility of the TLS team is overseeing of the Front end and Calibration unit. Furthermore, TLS will be also providing their expertise for the data reduction pipeline.

The overall contribution of TLS equals to 1/3 of the total project cost.

Deliverables: WP4, WP5

Universidad Catolica de Chile

The PUC team is led by [redacted] and consists of TBC members. The main responsibility of the PUC team is the delivery of the spectrograph .

The overall contribution of PUC equals to 1/3 of the total project cost.

Deliverables: WP6, WP7

4.3 New future partners and type of membership

There is a possibility for interest parties to join PLATOSPec as partners. New memberships will be possible under different regimes and different contributions scheme.

The types of new memberships are:

Full member shares a major contribution towards the hardware software, manpower and operational costs. In return a full members participates in full on core science program (equal share of observing nights, publication policy). A full member becomes a voting right in the Consortium board.

Minor partner – the contribution is a minor part towards the project costs. An example can be manpower or contribution towards operational costs. In return, corresponding science participation is foreseen (corresponding number of observing nights, publication policy participation). The weight of a vote of a minor partner in the Consortium board depends on the contribution towards

the project costs. The limit of the sum of contribution of minor partners shall not exceed 1/3 of the total costs.

Collaborative partner – the contribution should be clearly defined and it can consist of minor component of the projects SW/HW and a corresponding participation on science program. Collaborative partner does not have a vote in the Consortium board.

Each new partner must be approved unanimously by the Consortium Board.

5.0 Costs management and the budget

The overall project cost for implementation is estimated to reach 1.3 million EUR. The breakdown of the components is provided below:

Telescope – 290k EUR (7.5 mil CZK)
Mechanical works and dome - 80k EUR (2.0 mil CZK)
Front end - 30k EUR (780k CZK)
Spectrograph - 350k EUR (9.1 mil CZK)
Spectrograph FTEs - 35k EURx3yrs (2.7mil CZK)
Calibration unit . - 40k EUR (1.0 mil CZK)
Front end and cal. unit FTEs - 35k EURx1year (910k CZK)
Software - FTEs current employees (35k EURx1 - 910k CZK)
Pipeline - FTEs current employees (35k EURx1 - 910k CZK)
Mirror coating - 15k EUR (390tis CZK)

Total WITHOUT FTEs 805k EUR (21 mil CZK)
Total WITH FTEs = 1.1 mil EUR (26 mil CZK)
TOTAL with contingency 20% - 1.3 mil EUR (32 mil CZK)

OPERATIONAL COSTS TBC

Remark: FTE (FULL TIME EQUIVALENT) – 35k EUR

Current full partners of the Consortium plan to be responsible for 1/3 of the cost each.

The operational cost depends on the conditions negotiated by the Consortium with ESO but it is foreseen, that the operations should be performed in the remote/robotic mode. Therefore, we expect only maintenance fee and energy bills etc.. Furthermore, each partner or involved party has to provide remote observers who oversee the operations. Therefore, we plan 2 FTEs/year in total for observing manpower. Furthermore, 1 FTE is expected for data reduction pipelines and up to 1 FTE is assumed for project management tasks (also coordination of operations later). These FTEs are expected to be shared by partner institutes.

Limited service trips to La Silla are also foreseen in the normal operations phase. We expect 2 trips a year if there are no major maintenance issues occurring. The costs can be also kept relatively low because of PUC partner located at Santiago de Chile.

Each partner is responsible for control of their own costs and for keeping them on the agreed level.

6.0 PLATOSPec science operations and data handling

The Consortium will be conducting the primary science program which is aimed at TESS and PLATO mission support. PLATOSPec aims at membership in the PLATO GOP team. The main purpose and scientific objectives of PLATOSPec are:

1) Initial screening of TESS and PLATO targets
2) Radial velocity follow-up of TESS and PLATO targets
3) Characterization of Jupiter-sized planets
4) Brown dwarfs and low mass stars

PLATOSPec also has additional science objectives:

1) Stellar physics (asteroseismology, variable stars, binary stars)
2) Any other suitable program which can be proposed by scientists at partner institutes

The Consortium will define its own targets linked to primary targets of interest linked to Consortium primary scientific objectives and they will be protected.

The exact time share dedicated to Main scientific objectives will be defined in the MoU and it can change flexibly based on discussion in the Consortium board.

7.0 PLATOSPec operational mode and the data archiving

The telescope and spectrograph should operate remotely and with as minimum human interference as possible. We foresee up to two trips a year to service the telescope and spectrograph. However, all the operations should be performed in automatic mode. The safety of operations will be ensured by control mechanisms typical for robotic operations (cloud sensor, weather warnings).

The raw data will be acquired in a remote mode and stored on local discs but also transferred to ESO archive. All the data will be compatible compatible with ESO archive requirements for raw data and data products (Phase 3). Therefore, we aim to offer fully reduced 1D spectra to ESO archive. Data will have a proprietary period of 1 year and then they will be public.

Our collaborative members [redacted] and [redacted] (in their science time) from ESO Garching plan to contribute to successful implementation of required ESO data format.

8.0 Risk management

We identified two main risks, due to delay of the PLATO Space mission and due to delay of our project. The telescope will be tested in April 2019 and final feasibility recommendations will be made. Potential influence of these risks on our project is discussed below.

Our project will be ready to operate well ahead of PLATO mission launch (about 2-4 years). Therefore, we have enough time reserve if our project experiences delays. We will be still able to deliver scientific results before the PLATO mission is launched.

Our team possesses necessary experience with building of high resolution echelle spectrographs. Therefore, we do not expect any major delays with instrument ([redacted] et al. 2018, in prep – FIDEOS

spectrograph). On the telescope side, we identified potential suitable company (final company will be chosen in the public tender) for refurbishing of the telescope with huge experience.

If PLATO mission is delayed, we can focus on TESS targets and follow-up. In addition, ground based surveys will also deliver candidates. Finally, mission K2/Kepler will also provide hundreds of candidates which still will need follow-up

Any risks related to delays in either our project or PLATO project plans are thus negligible and they will not have any impact on scientific justification of the project.

The health of the telescope was tested and it was determined, that the telescope is in good mechanical shape. The mirror is not damaged (recoating needed) and the dome/slit works and needs only replacements of some wheels. The telescope is in a very good shape which is proportional to its idle period. Electronics need to be replaced but this is planned to enable the (semi-) robotization. Our team and/or identified companies have enough experience with previous telescope robotization projects (Dr. Vanzi in Chile – 1.0-m ESO telescope refurbishment; and PROJECTSOFT company in CZ 1.54-m Danish refurbishment). A brief report from technical tests is enclosed in Attachments section.

Our project will deliver high quality scientific results starting with TESS and throughout the PLATO mission. Furthermore, the instrument will be quite versatile and it could offer more time for other research topics established in the consortium institutes. Therefore, even if there are problems with PLATO mission launch or with our project time line, we will have enough reserve time, targets and projects to justify the installation of the spectrograph.

9.0 Disputes

The Consortium board will be responsible for handling of any issues or problems which might arise in any of the project phases. If necessary, the Consortium board can seek help of independent advisors which are not bound to any of the board members.