TMAS production.
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A) Elements:

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B) TMAS tasks

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A) Elements:

1. ADC:

* Prisms: 2 pairs of wedge prisms in the lab (inside the plastic boxes). Needs a final check. They are SK4/KsFN4, need a check? (**Richard/Sergi**)
* Needs a solution to attach them to the rotation stages. (**Jack**)
* Displacements: Each set of prisms needs to rotate, independently. They also need to tilt, independently. Therefore, it is needed some pair of n-axis aligner and their combination with the rotation stages. (**Sergi/Jack/Richard**).
* Cables for all the connectors needs to be extended to 6m. (**Ernest**)
* Already, some progress from Ernest: PR50 Series Compact High-Speed Rotation Stage and UTS series High-Performance Precision Translation Stage; which Rich ordered, came with cables attached to interface to the Newport 3-axis controller. These cables are 3 meters long and I believe that we wanted to extend them to 6 meters for the telescope. I can purchase 3 extension cable from Newport for $168.

* Power supply in the Newport main box in the rack. **Fine**.
* Control software from RoboAO/Reed Riddle. (**Jennifer/Sergi**)
Needs to be aligned in the lab:
* Input laser beam (laser, holder, power supply, …). (**Jack**)
* Overall alignment procedure to be consulted with Chris Shelton (JPL). (**Sergi/Richard**)

2.-Cameras

* How many for June? At least the iXon 888 one. (**Richard/Sergi**)
* Where will the iXon camera come from? When will it be in the lab? Borrowed at two different times? (**Richard/Sergi**)
* Overall functioning: PCI-E card and USB tasks in each camera: iXon 888 and sCMOS (**Ernest/Sergi**)
* Clarify the source of power supply for the cameras. (**Ernest/Sergi**)
* Determine the working temperature (**Richard/Sergi**) and the cooling system thereof (**Sergi/Ernest**)

3.-Coronagraph

Even though, we do not expect to use a coronagraph in June, we will likely use some obscuring circle for the extragalactic program. The exact position will come without he final optical design, but I guess that between the filter wheel and the camera in the main axis (longest one).

* Width of approx. 2 inches. (**Jack**)

4.- Enclosure

Needed for the lab testing already, so for mid January. (**Jack/Sergi**)

5.- Filter wheels

Anna Moore let me know that one of the filter wheels has the internal magnetic pieces corroded and we should test both asap.

* Get power supplies for them 12 V/?A. (**Ernest/Sergi**)
* Controllers are there, but we need to test the sw. There is a Windows version, from the webpage. A linux one, from Reed done for Anna. So, we have to decide which to use (**Jennifer/Sergi**)
* Extend the cables to 6 m: controller, power supply and ethernet cable. And this for each one. (**Ernest**)
* Integrate them in the RAC and, whenever possible, with the extend cables. (**Ernest/Sergi**)

6.-Filters

To be decided together with the science case, before the end of the year. Clearly, V, R, I, but probably also H alpha. Look further into line emissions (Sulfur, OI, OIII) for extragalactic (redshift considered) and for planetary atmospheres (could be high angular imaging of circumpolar clouds in Uranus, for instance) (**Richard/Sergi**)

7.-Lenses

To be ordered when the optical design is done. (**Richard**)

8.-Mechanical design

* Optical design to be given to Jack. (**Richard/Sergi**)
* Consider the spec limitation for any of the cameras (iXon or Neo): Minu=imum cable clearance at the rear of the cameras is 9 mm. (**Jack/Sergi**)
* In case of two channels, include the dichroic and the second channel filter wheel.
* In case of two channels, how to proceed on the breadboard on the lab (we would need the supporting structure for the second camera) (**Jack**)
* Include in it a model for the new rotation stages of the ADC. Add the prisms. 1 filter wheel per channel. Decide if 2 channels or 1 according to the optical design (**Jack/Richard/Sergi**)
* Include the alignment stages, once decided (**Sergi/Jack**).

9.-Breadboard

* Jack has a quote from a customized 16" x 54", thickness of 2.4": $ 1,365.00 and 6 weeks shipment. (**Done**).
* A12 inch may also be good enough. According to Jack: from an interface standpoint then yes a 12" X 48" plate (3 week lead time) would work, but it depends on what the optical layout is. $ 800. (**Done**)
* Breadborad to be used in the lab. Taking into account the fact that lenses, alignments and camera will not be available in few weeks time, decide if we start using the optical bench present on the desk for testing rotation stages, focusing stage, filter wheels, or other means. (**Sergi/Richard/Jack**)

10.-Optical design

* Mainly finished. The final design depends on the number of cameras for June and which ones, which still remains to be decided. (**Richard/Sergi**)

* Final best field of view (as of now secured central 15 arcsec in the worst scenario). This will be related to the data processing pipeline. (**Richard/Sergi**)

11.-Stargate and GPU

* Bring the GPU from the summit to the lab. (**Jennifer**)
* Integrate the GPU into Stargate. (**Jennifer**)
* Check memory already available for tests and RAM. (**Jennifer**)
* Installation of control software for the cameras, Filter wheels and ADC stages (2 rotation, 2 aligners), 1 focusing (x-axis) stage. Linux versions for all. (**Sergi/Jennifer**) But check they are ready to use for our purposes. (**Sergi**)
* Once the scientific program and the number of cameras is optimized, decide how much internal memory has to be purchased. According to Jennifer: 1 Tb is $ 100, for a 500 Mb/s disc. Check speeds are appropriate with 2.5k x 2k at 30-40 Hz if the sCMOS Neo cameras are present and how many.

12. Room computer(s)

* Get a second computer to communicate with Stargate, as will be the case from the control room at the summit. (**Ernest/Jennifer/Sergi**).
* Basic specs in terms of number of USB ports, RAM, CPU, OS(s), ethernet cables and screen/mouse/keyboard. (**Jennifer/Sergi**)
* Can this second computer be the one that will go to the summit?
* Ultimately, we may want to test a full emulation in the lab,using the remote control room. (**Jennifer/Sergi**)
* External disks to bring back the data? (**Richard/Jennifer/Sergi**)

13. Rack

* Locate the P3K spare rack at TMAS bench. (**Ernest/Done**)
* Locate enclosure panels (**Ernest/Richard**)
* Overall disposition: cameras, newport controllers, Stargate, filter wheels. (**Ernest**)
* Overall power supply in the lab for them. (**Ernest**)
* Install Newport 3-port controller. (**Ernest/Sergi**)
* Install Filter wheel controllers and cables. (**Ernest/Sergi**)
* Install Stargate. (**Ernest/Jennifer/Sergi**)

14. TMAS rear panel

* ADC: 2 connector cables for the two rotation stages. ? connector cables for the axis aligner.
* Cameras. For each of them: 1 PCI-E link, 1 USB, 1? Power supply, 1 water pipe (to be confirmed)
* Filter wheels. For each one: 1 power supply, 1 ethernet cable, 1 connector cable.
* Others (**All**)

15. Redundant system.

* Determination of those components that may need a redundant element in the lab. Replacement/Alternatives for breakdowns and failures of those components that are critical (Stargate, Control room (sw installation), chiller, etc …). To be considered in the following weeks. (**ALL**)

16. Real-time data processing pipeline

* Test the RAM/CPU capabilities of the GPU with some simulated images: readout speeds & array sizes. (**Jennifer/Sergi**)
* test the precision in the time stamps for the fast reading modes. Is it enough or do we need a GPS or is it available a fast communication with some summit device? (**Jennifer/Sergi**)
* Basic algorithm(s). Discussion (**Jennifer/Sergi**) and implementation (**Jennifer/Sergi**)
* Refined memory optimization (subarray processing, external array accumulation, etc …) (**Jennifer/Sergi**)
* Tests of scientific program targets (**Sergi**)
* Tests with ADC alignment (**Jack/Jennifer/Sergi**)

B) TMAS TASKS

Richard:

* Which cameras in the end?
* Where and when may we have the iXon camera for testing and for observations? Shall we proceed already with asking for a demo, for the time the lenses will be at he Lab, regardless of any other perspective?
* Science program for the two nights (possible targets, priorities and alternatives, integration time, working temperature, filters, rough estimation of memory needs) with Sergi, as well.
* Order the lenses (if not available at the lab) when the optical design is done.
* Optical design. It depends on the final cameras and which ones.
* From some docs, the prisms seems to be SK4/KsFN4, need a check? If so, how for Sergi to know what to do.
* Best field of view. Relevant for the data processing pipeline and memory considerations.
* More cables, connectors than the ones in item 14 above?

Ernest:

* Get 2 power supply units for the Filter wheels, once the intensity is known (12V/?A).
* Confirm if the link cable to the PCI-E cards is for data flow and the USB is for camera control.
* Power supply to the cameras. where does it come from?
* Extend the 3 cables per Filter wheel: connector, power supply and ethernet.
* Put them in the rack, with support from Sergi -who can help in the Rack operations.

* Once the specs for a room computer are given (Jennifer/Sergi), try to find a spare one to be used in the lab (a screen, mouse and keyboard too).
* More cables, connectors than the ones in item 14 above?

Jack:

* Enclosure. Think about a possible solution. Sergi may check if Roger Smith can help us with some ideas/suggestions and perhaps even with some material not used anymore in the PPP project.
* prism holders for the ADC. First sketch of a solution. Ultimately, it will be decided with the definite dimensions from the optical design.
* Input laser beam. First overall check of available elements.
* Consider the 2 inch coronagraph between the filter wheel and the camera in the horizontal axis in the mechanical design.
* Consider, when given, the two stages for axis alignment for each of the ADC rotation stages.
* When the number of cameras is clear, check the availability of the necessary structural elements for that. Include the dichroic in this case in the mechanical model.
* More cables, connectors than the ones in item 14 above?

Jennifer:

* Bring from the summit the GPU card.
* Install it in Stargate.
* Check main characteristics: RAM, memory for storing data.
* Test GPU capabilities with simulated data.
* Decide how to install the controller software (linux) for the 2 rotation stages, the 2 axis aligners, the filter wheels and the cameras. Some is under Windows if worth.
* Role of a room computer that will communicate with Stargate and the controllers: basic specs (USB, RAM, CPU, OS(s))
* Discussion of basic algorithms of real-time processing and implementation.
* Discussion of refined processing algorithms, aimed at optimizing speed and less memory consumption according to the science target.
* Test of the former concepts in the lab.
* More cables, connectors than the ones in item 14 above?

Sergi:

* Check what needs to be adapted from the ADC software from Reed for the control of the rotation stages of the ADC to the new rotation stages purchased.
* Confirm if the link cable to the PCI-E cards is for data flow and the USB is for camera control.
* Power supply to the cameras. where does it come from?
* Axis alignment stages. Confirm the need of two, vendor and the combination with the rotation stages.
* Breadboard to used in the lab or else, before the final one is available.
* Best field of view. Relevant for the data processing pipeline and memory considerations. Work with Jennifer for the optimization of the on-line data reduction pipeline.
* Installation of controllers software in Stargate.
* Test GPU capabilities with simulated data.
* Room computer: Check with Jennifer specs. Other periferics and screen.
* Room computer: communication with stargate and gpu.
* Working temperature.
* Cooling system.
* Discussion of basic algorithms of real-time processing and implementation.
* Discussion of refined processing algorithms, aimed at optimizing speed and less memory consumption according to the science target.
* Test of the former in the lab.
* More cables, connectors than the ones in item 14 above?