TMAS production.
Date: 09/12/11
Version: 1.5
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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. Waiting for an answer. (**Sergi**)
* Jack has an idea to attach them to the rotation stages. He needs final distances to take into account tilting. On Monday we can tell him some more precise numbers. (**Sergi/Richard/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. To check if a tip/tilt one is possible. (**Sergi/Jack/Richard**).
* The 3 connectors will be extended to 6m. That means: PR50 Series Compact High-Speed Rotation Stage and UTS series High-Performance Precision Translation Stage. These cables are 3 meters long. I can purchase 3 extension cable from Newport for $168. (**Ernest**)
* Power supply in the Newport main box in the rack. **Fine**.
* Control software from RoboAO/Reed Riddle (Newport controller: rotation stages, focusing and the ones for the alignment stage). (**Jennifer/Sergi**)

Needs to be aligned in the lab:

* Input laser beam (laser, holder, power supply, …). We will check if we can use the one used in Robo-AO.
* Overall alignment procedure to be consulted with Chris Shelton (JPL). (**Sergi/Richard**)

2.-Cameras

* Two cameras/two options for June: 2 Neos/ 1 Neo and 1 iXon. (**Done**)
* Next week, it will be decided which camera will be bought for TMAS. (**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**)
* Source of power supply for the cameras. AC 2 DC in the rack and then powers the camera. Last check. (**Ernest**)
* 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. Support. (**Jack/Sergi**)

4.- Enclosure

Needed for the lab testing already, so for mid January. Jack has the idea of using some aluminum bars, of 1 inch width, and place the panels in the exterior with some brackets to the breadboard if necessary. (**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.

* Ernest will get two power supplies for them 12 V/1.25A.
* 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 both controller cables for both filter wheels to 6 m. Power supply and ethernet cable will be on the rack. (**Ernest**)
* Integrate them in the RAC and, whenever possible, with the extended 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. An actualized list of items has been given. (**Richard/Sergi**)
* Consider the spec limitation for any of the cameras (iXon or Neo): Minimum cable clearance at the rear of the cameras is 90 mm. It can be less. The purpose is also ventilation. Jack is thinking in a more elaborate design with the last given inputs. (**Jack/Sergi**)
* Include the dichroic and the second channel filter wheel. (**Jack**)
* Both cameras are to be laid down in the same surface, if possible. Checking heights (**Jack/Sergi/Richard**)
* 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. **On-going**. (**Jack/Richard/Sergi**)
* Include the alignment stages. **Done**. (**Sergi/Jack**).
* Given the minimum necessary rear space, which includes connectors, bending of cables and pipes, what is the maximum distance between the camera and the P3K input beam? This requires some thinking about the fold mirror location (see later)?
* Given that there will be a flip mount (see location later) manually controlled, which is the best lace to put the main beam camera? It is somehow related to the previous one, too.

9.-Breadboard

* **Jack has a quote from a customized 16" x 54", thickness of 2.4": $ 1,365.00 and 6 weeks shipment. (Done). A 12 inch may also be good enough. According to Jack: from an interface standpoint then yes a 12" X 48" plate (3 week deliver time) would work, but it depends on what the optical layout is: *48"*. $ 800. (Done)**

* The decision so far is to go for the customize one. Next week should be decided due to deliver times.

* Breadborad to be used in the lab. Shall 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, see twiki. The final design will have two cameras as thought some time ago. (**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**)
* Mirror at the exist of P3K in TMAS. It is a fold mirror of 2-4". The support has to be rigid. Richard will check if he can find one. (**Richard/Sergi**)
* The beam from P3K comes from the side close to the racks. Therefore, the cameras, especially, the one on the main beam, are farther. Richard to check on-site lengths of all paths for the cables. (**Richard/Sergi)**

11.-Farscape and GPU

* Moving to FARSCAPE! **DONE**. Jennifer checking it.
* Bring the GPU from the summit to the lab. **Done**. (**Jennifer**)
* Integrate the GPU into Stargate. **Done**. Under testing. (**Jennifer**)
* Check memory already available for tests and RAM. 1.3 Gb the main processor. From GPU: 8 Gb. (**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 ethernet cables. The one found by Ernest seems to be fine. However, an upgrade to 2 Gb would be worth. **Done**.
* screen/mouse/keyboard. Ask Roger and Patrick, also for the extra 1 Gb module (give name or specs from Ernest). (**Sergi**)
* OSs to be confirmed (**Sergi**)
* Can this second computer be the one that will go to the summit? It seems so. **Done**.
* 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**)
* Blank panels for the front. Find standard sizes to adapt the disposition in the rack to them. (**Jack**)
* Overall disposition: cameras, newport controllers, Stargate, filter wheels. As low as possible, especially for the cameras since cables cannot be longer than 6 m. (**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 Farscape. (**Ernest/Jennifer/Sergi**)
* Get a HUB (**Ernest/Sergi**)
* Get a Network PS (**Ernest**)

14. TMAS rear panel

* ADC: 2 connector cables for the two rotation stages. 1 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.
* Make a list, so that Ernest can write the model of each one.
* 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:

* Measure the lengths on-site for the cables.
* Check the availability of some elements: fold mirror and support, dichroic, axis alignment.
* 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.
* Decide which camera is best for the extragalactic program.
* Order the lenses (if not available at the lab) when the optical design is done.
* Optical design. Give enough info for Jack to progress on the mechanical design.
* 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, (12V/1.25A).
* 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?
* Extension of the connector cables per Filter wheel: connector. Power supply and ethernet in the rack.
* Put them in the rack, farscape in the lower end. It is not rack mounted. With support from Sergi -who can help in the Rack operations.
* Once the lengths are clear, order the extension of the other cables, taking into account their position in the rack and in the instrument.
* More cables, connectors than the ones in item 14 above?

Jack:

* Given the minimum necessary rear space, which includes connectors, bending of cables and pipes, what is the maximum distance between the camera and the P3K input beam? This requires some thinking about the fold mirror location (see later)?
* Given that there will be a flip mount (see location later) manually controlled, which is the best lace to put the main beam camera? It is somehow related to the previous one, too.
* Blank panels for the front. Find standard sizes.
* Enclosure. Show a design.
* Mechanical design with the elements at the end.
* More cables, connectors than the ones in item 14 above?

Jennifer:

* 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.
* 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 and the x-axis stage. Also, for the alignment stages, once clear how many.
* Enclosure. Sergi to check if Roger Smith can help us with some ideas/suggestions and perhaps even with some material not used anymore in the PPP project.
* Check the monitor 19"/21" with Roger and the keyboard, mouse and 1 Gb additional with Patrick.
* Confirm if the link cable to the PCI-E cards is for data flow and the USB is for camera control.
* Check if a tip/tilt is worth compared to axis alignment.
* Ask about the element/model/support for the coated glass in place of the chronograph.
* From some docs, the prisms seems to be SK4/KsFN4. Check. I have asked Christoph.
* Ask Roger for some deals about the enclosure and Jack some drawing, material, availability at Caltech, … for next week's summary.
* 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?
* Breadboard to use in the lab or else, before the final one is available. Look point 9.
* 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.
* Input laser beam. Check of available elements.
* 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?

Elements for the mechanical design:

The elements that would be nice to have in the new design are:

1.-Incorporate the packs and their height (1"?)
2.-BB: Work with the 54" x 16" x 2.4"
3.-axis-alignment: mod 9071 Newport
4.-Rotation stages and Racket
5.-UTS (for the 2nd camera)
6.-Input fold (mirror that reflects the incoming beam from P3K)
7.-Dychroic: after the ADC (2 to 4")
8.-Main beam lenses
8.1.- 1 between the camera and the filter wheel (IFW)
8.2.- 1 more between the former and the IFW. This one goes with a flip mount.
8.3.- 1 between the IFW and the ADC
8.4.- Coating stop (circle of ~2" with a drak circle in the center). To be decided if between the ADC and the dychroic, or next to the one with the flip mount. I would suggest the latter as of now.
8.5.- Lyot mask (see attached image). Between the dychroic and the IFW.

9.-Mirror for the reflection of the second camera in a parallel design.
10.-The second IFW, before the reflection, for instance.
11.-A second lens between the reflection and the second camera.

12.-Enclosure: Some scheme where the panels and the supporting bars can be seen (can wait till mid next week).