# ARGOS Tip Tilt – commissioning February 2015

*G. Orban de Xivry -- draft*

*Day time task list:*

1. Swap fibers + geometry check
2. Aperture wheel: update, test, calibration
3. Dark acquisition
4. Flat acquisition with internal source
5. Test of Pyramid ICE interface implemented functionalities
6. Differential flexure quad-cell vs pyramid for different rotator (incl. K-mirror) angles.
7. Calibration source acquisition
8. **Interaction and reconstructor matrices acquisitions**
9. TT Close-loop in day time
10. \*calibration of other FLAO FW1 offset positions

*Night time task list:*

1. Star acquisition + do it at different rotation angles.
2. APD flux vs star magnitude check
3. Tip-Tilt closed-loop
4. … Comparison with pyramid, check depending on seeing (ARGOS on/off), different rotator angle,…

# Daytime

## Swap fibers + geometry check

*Objective*: matching Bonn unit computation.

*To Do:*

* Swap fibers connected to the APD module in the LGSW rack.

Current situation:

|  |  |
| --- | --- |
| Channels of APD unit | Fiber |
| 3 (top) | 1 |
| 2 | 2 |
| 1 | 3 |
| 0 (bottom) | 4 |

Proposed change:

|  |  |
| --- | --- |
| Ch. | Fiber |
| 3 | 2 |
| 2 | 1 |
| 1 | 3 |
| 0 | 4 |

Which will give a quad-cell geometry of:

| 4 | 3 |

| 2 | 1 |

Instead of

| 1 | 2 |

| 3 | 4 |

assumed by the Bonn unit tip-tilt computation.

A zero-angle (to be set in the TT argos software) of 180degrees thus re-established the intuitive computation geometry.

* Install internal FLAO light source with ND~2 filter.
* Verification with the internal FLAO light source by checking APD vs Pyramid axes.

## Aperture Wheel: update PC software and ARGOS, test, and calibration

*Objective*: ensure proper centering of the Aperture(s) w.r.t. the quad cell. This for, at least, the largest aperture.

*To Do:*

* Update aperture wheel pc
* Update ARGOS software
* Test functionality: illuminate with internal source defocused, and mask out light by changing the offset.
* Calibrate: with light source on (defocused), scan offset and create a “top-hat” plot to find center of aperture matching center of quad-cell. This could be done for all 7 apertures.

## Dark acquisition

*Objective*: obtain a good dark current for all four APD. Important if the damaged/nude fiber is not shielded. Else it is not strictly necessary.

*To Do*:

* Doing dark with aperture wheel closed (or night with dome closed).
* … a dark/sky could be taken each time before closing the tip-tilt loop on sky. Not strictly necessary

## Flat

Objective: obtain a good relative efficiency between all four channels.

To Do:

* Use internal source (with ND=2 ?), shifting to each APD channels and measuring flux
* Repeat to check consistency (to reach ~10% reproducibility).

## Test APD + Pyramid

Objective: center on quad-cell and pyramid together. Test ARGOS / FLAO software functionalities.

To Do:

* Center internal light source on both quad-cell and pyr in the configuration:

FW1 50/50, 0 rotator angle. Check PI mirror offset on pyramid arm required.

* Try and reproduce the operation with ARGOS software (/ Pyr ICE interface).

## Calibration: differential flexure quad-cell vs. pyramid

Objective: acquire “LUT” of PI mirror offsets of different rotator angles (incl. K-mirror enabled) enabling to center both on quad-cell and on the pyramid.

To Do:

* Light source (internal FLAO src or calibration src ?)
* Enable K-mirror
* Apply angle at rotator
* Center on APD, and then center on pyramid by changing PI mirror offset, and record it.

## Calibration source acquisition.

Objective : establish the acquisition procedure of the on-axis calibration src (ARGOS).

To Do:

* Setup quad-cell (aperture wheel close)-- FLAO
* On-axis src with min flux and acquire it on the pyramid
* Open aperture wheel, and increase light src to higher flux for max SNR.

## Interaction & reconstructor matrices acquisitions

Objective: get going

To Do:

* On-axis light source (ARGOS). Check PSF size (tech viewer? Or luci?) and be careful with light src (see sec. 7, eg.).
* Create Modal history and adjust amplitude of tip-tilt applied on the ASM to match ~linear range of quad-cell.
* Check relative orientation ASM vs quad-cell, and modify rotator angle to get best sensitivity (diagonal of the APD?)
* Experiment software IM TT acquisition routine and REC
* Make sure there are no effect of dropped TT frame etc. / check repeatability?
* Compare with different modal-history (different ampliture or on/off scheme) to see if gain in signal…

## TT closed-loop daytime test

Objective: experience TT closed loop only. And then with ARGOS (mixed REC)

To Do:

* Load disturbance (is there a tt-only disturbance?) and TT REC only
* Test gain range / correction. Which diagnostics to use? RMS on APD? Sth else? Modal plot from ASM diagnostics?
* Perform the same with mixed REC.

## Calibration of other FLAO FW1 offset positions

Optional

Objective: accommodate for different FW1 positions (e.g. more light directed to APD for fainter TT star).

To Do: similar to section 6, e.g.

# Night time

## Star acquisition + do it at different rotation angles.

Objective: experience acquisition (incl. Pyr control from ARGOS) and the flexure “LUT” acquired in daytime.

## APD flux vs star magnitude check

Objective: experience APD flux/tip-tilt sensitivity, and verify magnitude zero-point. (A detailed verification is maybe best done in closed-loop and with proper sky subtraction – not necessarily intended here)

## Tip-Tilt closed-loop

Objective: experience tip-tilt closed loop in nightime

To Do:

* Check tip-tilt closed-loop/ open-loop alone with the APD
* Same open/close with ARGOS laser closed-loop
* Experience if better laser closed first or tip-tilt closed-first… w.r.t. also to initial telescope defocus / PSF size, etc.

## Comparison with pyramid, check depending on seeing (ARGOS on/off), different rotator angle,…

Objective: compare perf pyramid tip-tilt vs APD tip-tilt. Performance different aspects.

To Do:

* Open/closed-loop APD tip-tilt vs. Open/closed-loop Pyr tip-tilt, with ASM diag.?
* Check this for several guide star magnitude.
* ….