PANIC in the lab: status before commissioning

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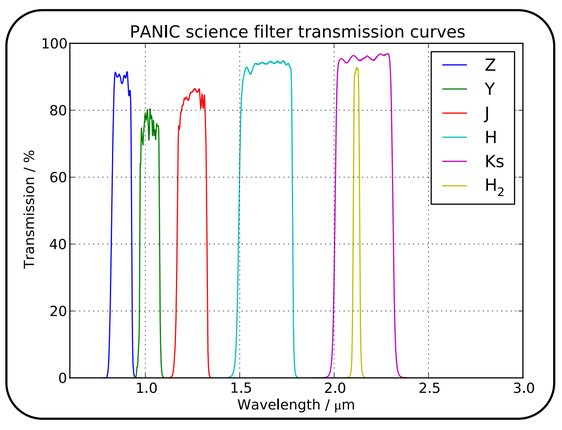
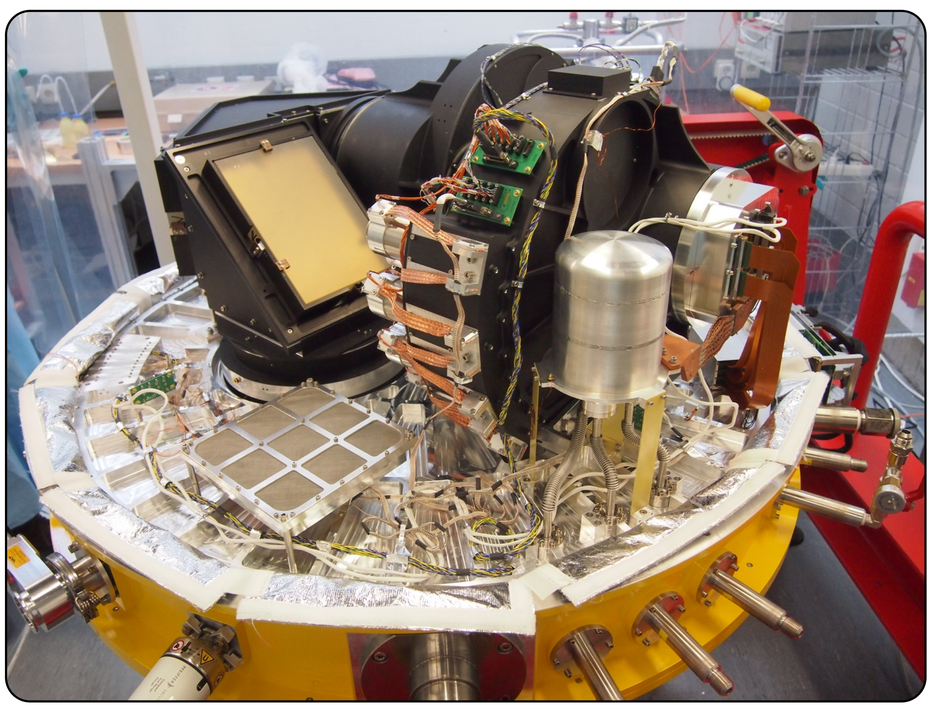
Instrument status

PANIC is the PAnoramic Near-Infrared camera for Calar Alto, a joint project by the MPIA in Heidelberg, Germany, and the IAA in Granada, Spain[(1), (2)]. It can be operated at the 2.2m or 3.5m CAHA telescopes to observe a field of view of 30'x30' or 15'x15' respectively, with a sampling of 0.45” or 0.225” (4096x4096 pixels). It is designed for the spectral bands from Z to K, and can be equipped with additional narrow-band filters. All the hardware except the cryostat window is cooled with liquid nitrogen to about 100K, including cold field and pupil stops to reduce the thermal background.



The instrument is close to completion in the lab at MPIA. The cryostat, mechanical and electrical systems have been tested and are routinely operated. The instrument control software GEIRS [(3)] is continuously used without problems. The high-level operation software (observation tool OT, reduction pipeline PAPI, quicklook tool QL, time-series analysis LEMON[(4)]) has been tested with data from Omega2000 and partly during an integration phase in the lab.

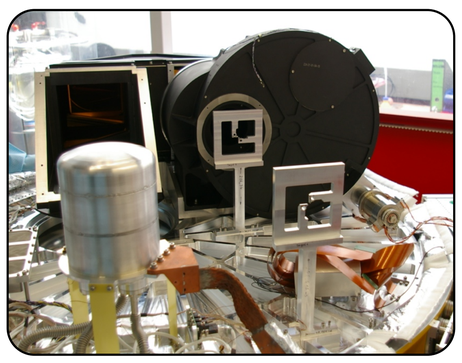
All mirrors and lenses have been installed and aligned in their mounts. The filters (transmission curves left) have been delivered and successfully cryocycled. Integration in the wheel will take place in the coming weeks.

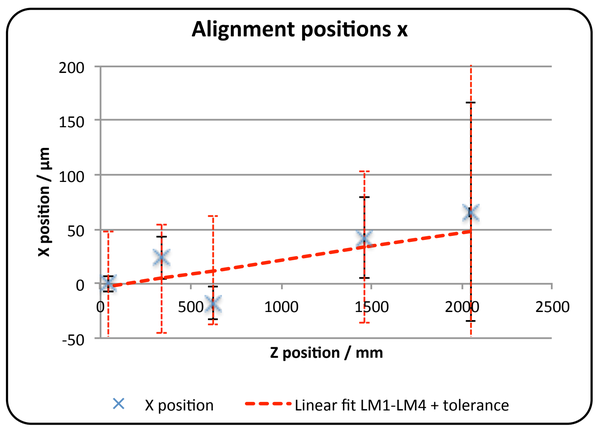


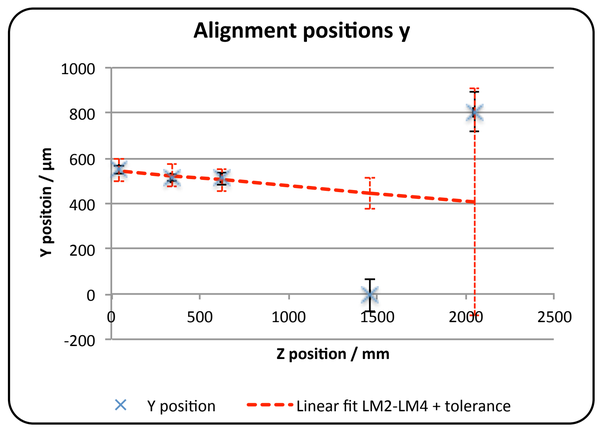
Opto-mechanical alignment

The optical design allows only very small tolerances, in particular for lateral positions of the lenses. The alignment of the structures to a common opto-mechanical axis has been performed by homing at position targets (right) and a reference mirror with a micro-alignment telescope.

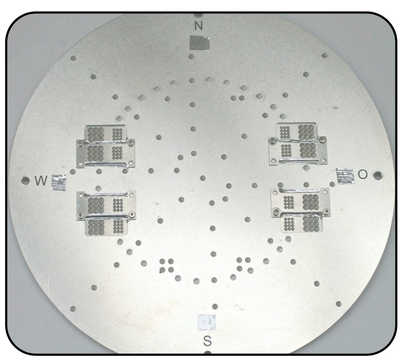
The measurements were taken at cold, and corrections applied at warm. The final positions and tilts of the lens mount interfaces are within tolerances (bottom left and right), except for one. The impact of the offsets is considered negligible.



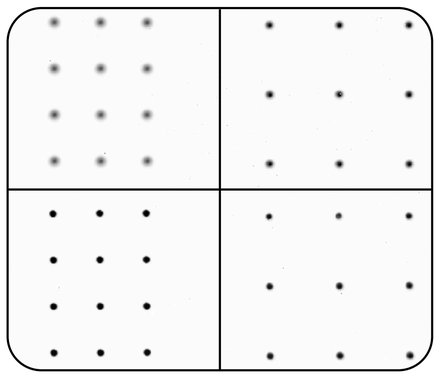


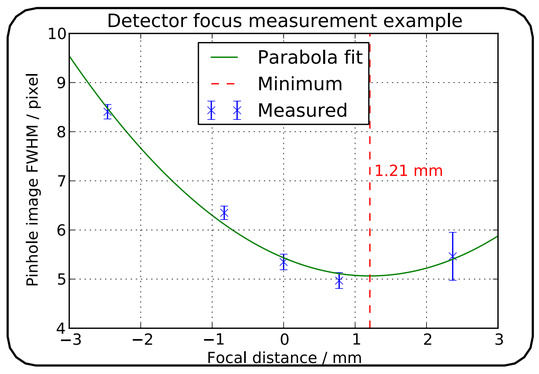


Detector focus



The current alignment has the purpose to bring the detector into focus. It has to be placed at the conjugate of the telescope focal plane at the instrument entrance. Therefore, a focal plane mask (left) is mounted at the location of the field stop. Groups of pinholes at different z-positions provide off- and in-focus images on the detector (zoom bottom left). By measuring their size, the current detector position can be fitted (bottom right), and transformed into a correction of the interface shim.



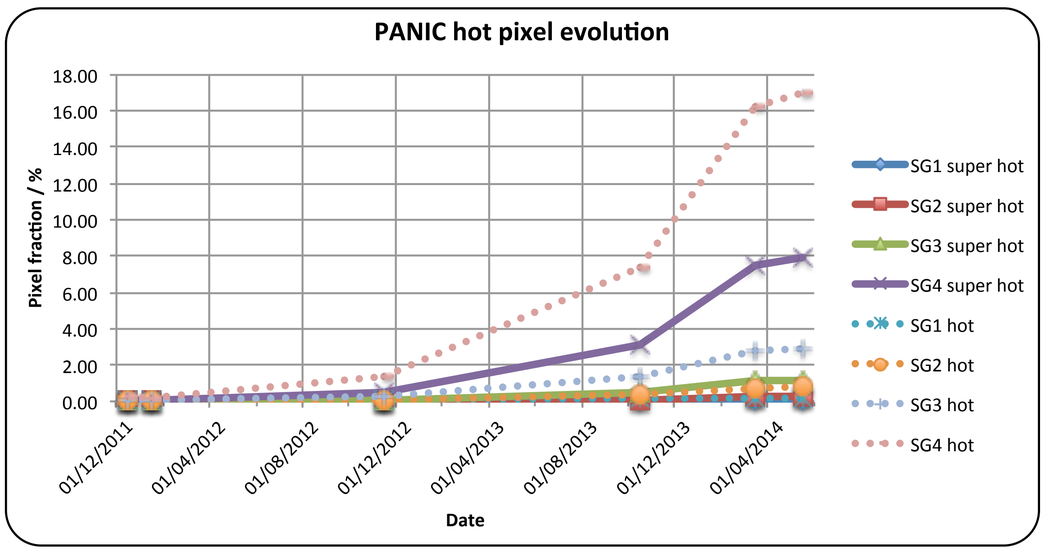


Detector performance

After optimization of the readout[(5), (6)], the four detectors perform as listed in the table. Noise and gain are similar to the data from Teledyne. The dark current is partially increased due to degradation.

Parameter	SG1	SG2	SG3	SG4
Gain / e–/ADU	4.45	4.69	4.82	5.96
Saturation / ADU	50376	48994	46903	42454
CDS readnoise / e–	15±2.9	17±3.5	19±3.8	21±4.6
Modal dark current / e–/s	0.84	0.60	0.83	2.29
Hot pixels / % (Dark >2,500 e–/s)	0.14	0.82	2.87	16.97
Low QE pixels / %	0.02	0.28	0.17	0.13

Detector degradation



After the long storage at ambient, in particular one detector shows a highly increased number of hot pixels. The fraction of pixels with dark signals >2,500 e–/s has reached 17%. This rise in dark current is know from other HAWAII-2RG arrays from the same manufacturing period[(7), (8)]. The degraded chip will likely be replaced after successful commissioning at the telescope.

References

(1) Fried, J. W. et al., SPIE 7735, 77353V (2010)
(2) Fried, J. W. et al., SPIE 8446, 84462Q (2012)
(3) Ibáñez, J.M. et al., SPIE 7740, 77402E (2010)
(4) Ibáñez, J.M. et al., SPIE 8451, 84511E (2012)
(5) Naranjo, V. et al., SPIE 7742, 77421R (2010)
(6) Storz, C. et al., SPIE 8453, 84532E (2012)
(7) Blank, R. et al., SPIE 8453, 845310 (2012)
(8) Stahle, C. et al., JWST-RPT-017457 (2011)

Contact information

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