

AMI + KPI Commissioning Observations

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AMI/KPI Workshop, July 25-27 2022

Objectives

AMI Commissioning program: NIS-019, PID 1093

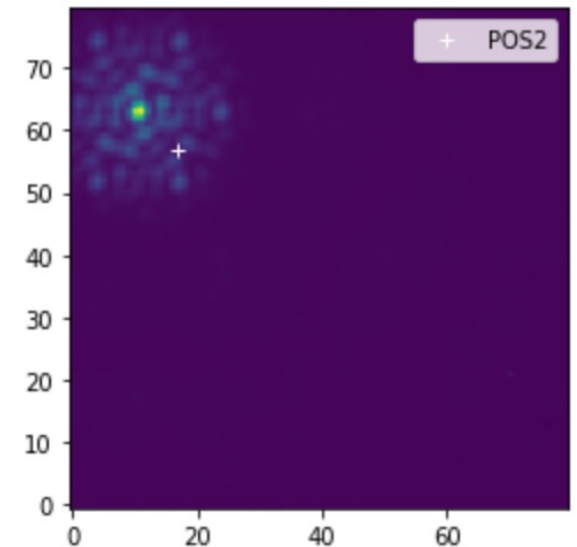
- The performance of the NIRISS Non-Redundant Mask (NRM) will be characterized in its three medium-band filters (F380M, F430M, and F480M) with bright stellar sources. A binary star (target) with a known separation and contrast will be observed in the pre-defined subarray SUB80 array of this mode in the NISRAPID readout pattern.
- AMI Science Readiness Criterion:
 - After calibrating Target observables with the best calibrator(s), MCMC binary search yields (Flux ratio, Separation, PA) that agree with previously known (or extrapolated) values within 3-sigma of the prior estimates in each of F380M, F430M, F480M.
- KPI Readiness:
 - Compare extracted kernel phases for each of the four KPI targets to those from simulated KPI observations. Expect > 5 magnitudes contrast achievable in KP working separation range.
- Other analysis includes:
 - Comparison of observed and simulated interferometric observables (closure phases, squared visibilities) for both raw and calibrated binary and point-source targets
 - NRM sub-aperture position location in pupil check
 - Check if TA accuracy meets science requirements
 - Charge migration existence and initial in-flight measurement
 - Primary and sub-pixel dither accuracy

Observations (epoch 1)

Obs No.	Target	Pupil/Filter	Primary positions	Subpixel dithers
1	AB Dor	NRM+F480M/F430M/F380M/F480M	1,2	0
2	AB Dor	NRM+F480M/F430M/F380M	1,2	0
3	AB Dor	NRM+F480M	1	5
4	HD37093	NRM+F480M/F430M/F380M	1,2	0
5	HD37093	NRM+F480M	1	5
6	HD36805	NRM+F480M/F430M/F380M	1,2	0
7	HD36805	NRM+F480M	1	25
8	J062802.01-663738.0	NRM+F480M, CLEARP+F480M	1,2	0
9	TYC-8906-1660-1	NRM+F480M, CLEARP+F480M	1,2	0
10	CPD-66-562	NRM+F480M, CLEARP+F480M	1,2	0
11	CPD-67-607	NRM+F480M, CLEARP+F480M	1,2	0

Target Acquisition Issue

- NIRISS TA first used in NIS-020 a few days before NIS-019 was scheduled to be observed. Succeeded operationally, but target not centered in image...
 - Issue traced to OSS script error in translating TA subarray location to science subarray location
- Too late to pull NIS-019 from the OP, so it was executed on May 23.
- Target placement up to 8.5 pixels off from defined dither positions and PSF poorly centered in pixel – reobservation required
 - AMI extremely sensitive to placement differences between target and calibrator (due to flat field, uneven pixel response, etc) so target acquisition is critical!
 - Best bad pixel fix method (Kammerer-Ireland) also doesn't work when target too close to subarray edge



Re-observations (epoch 2)

New POS2 defined as POS1 + offset for reobservation. One KPI target skipped because it was found to be binary in epoch 1

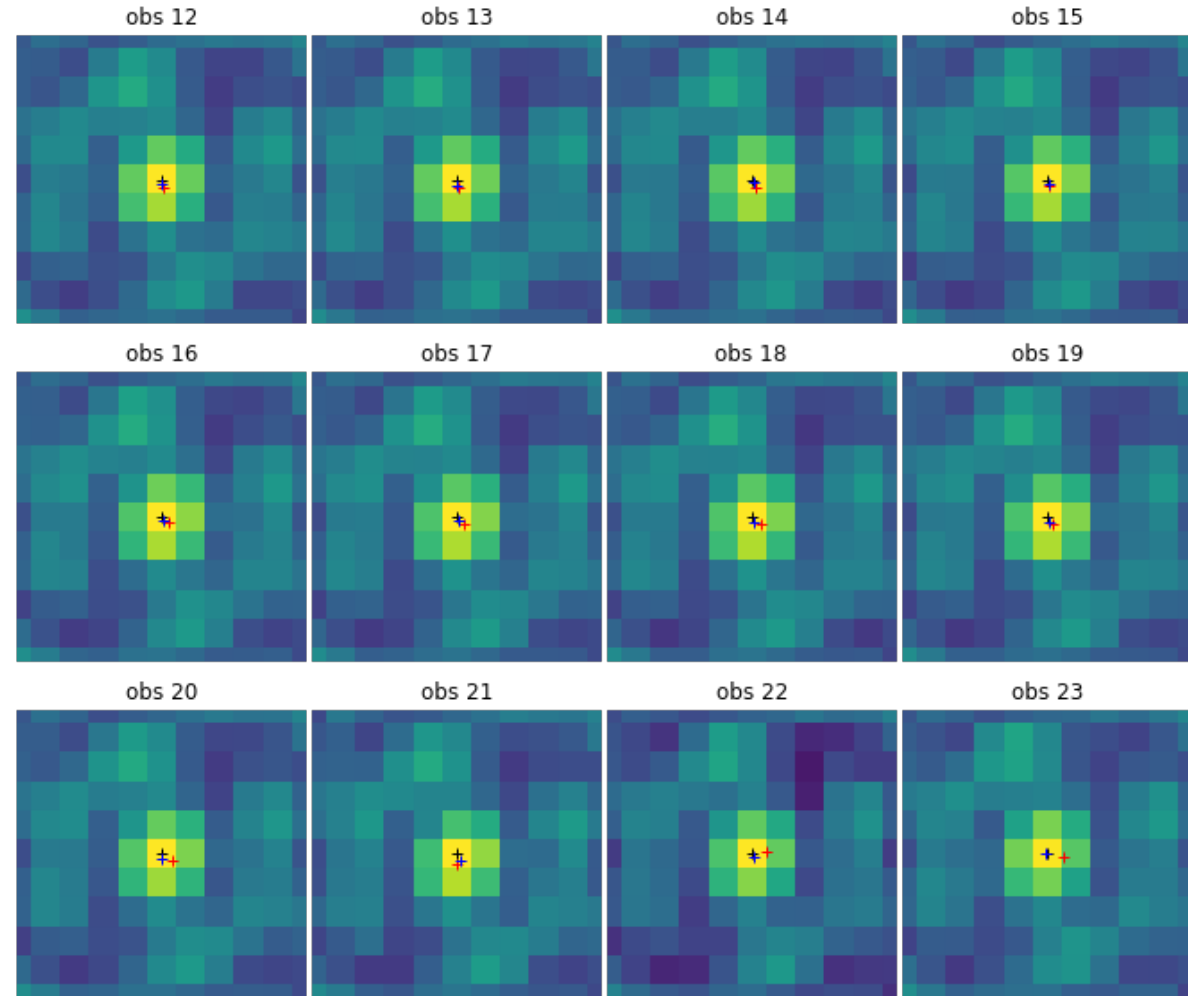
Obs No.	Target	Pupil/Filter	Primary positions	Subpixel dithers
12	AB Dor	NRM+F480M/F430M/F380M/F480M	1	0
13	AB Dor	NRM+F480M/F430M/F380M/F480M	1 + offset	0
14	AB Dor	NRM+F480M	1	5
15	HD37093	NRM+F480M/F430M/F380M	1	0
16	HD37093	NRM+F480M/F430M/F380M	1 + offset	0
17	HD36805	NRM+F480M	1	5
18	HD36805	NRM+F480M/F430M/F380M	1	0
19	HD36805	NRM+F480M/F430M/F380M	1+ offset	0
20	HD36805	NRM+F480M	1	25
21	J062802.01-663738.0	NRM+F480M, CLEARP+F480M	1,2	0
22	TYC-8906-1660-1	NRM+F480M, CLEARP+F480M	1,2	0
23	CPD-67-607	NRM+F480M, CLEARP+F480M	1,2	0

Successful ta

X offset: 0.052 ± 0.05 px

Y offset: -0.139 ± 0.06 px

Small offset, but repeatable!



- + centroid_2dg
- + commanded (32,32)
- + Anderson & King