14425 - STIS Focus + Parallel Measurements Cycle 23

Cycle: 23, Proposal Category: CAL/STIS

(Availability Mode: RESTRICTED)

INVESTIGATORS

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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
P2	(1) HD2072 ANY	ACS/WFC STIS/CCD WFC3/UVIS	1	20-Oct-2015 21:58:32.0	yes

1 Total Orbits Used

ABSTRACT

This proposal will repeat visit P2 of program 14063 to check the stability of the focus offset between the STIS/CCD, the ACS/WFC, and the WFC3/UVIS detectors

Parallel observations will use STIS MIRVIS F28X50OII, WFC3 F410M, and ACS F502N

A UV bright star will be observed with STIS while parallel observations are done of a rich star field using WFC3 and ACS. The filters are chosen to allow phase retrieval to estimate the focus and other optical parameters from the PSF images. Simultaneous parallel observations allow a differential

measure of the focus offset between the two instruments without having to rely on the accuracy of the breathing model. A one orbit pointing will be done in the globular cluster 47 Tuc. The introduction of the narrow band OII filter does defocus the STIS CCD images, as the CCD image mode is optimized for a clear aperture, but the offsets measured in this visit can be compared with those seen in June 2016 in program 14063.

OBSERVING DESCRIPTION

All visits have schedulability set to 100%.

This program repeats Visit P2 of program 14063. Some minor changes were made to the exposure times from that program. All STIS OII ACCUM exposures are now 35 s long, and the ACS 502N observations were increased from 200 s to 360 s.

The STIS target will be HD2702, a bright V=9 star located about 6' from the center of 47 Tuc. A STIS box dither pattern will be used to . The orbit packing and dump timing allows the inclusion of two ACS F502N full frame parallels for this visit, so we don't bother with the subarrays for this one. The same dithers will be used as in visit 02, but since the ACS parallels differ between the dither points, the dither positions need to be entered as POS TARGs on the primary exposures rather than by using a pattern.

Exposure estimates for the 47 Tuc WFC3 field were done by comparing to a 132 s F438W exposure (IBQF03GIQ) taken of a different field at a similar cluster radius and stellar density. This exposure has about 1.5X the effective depth of the 360s F410M images included here, so the crowding and the number of good focus stars should be comparable in each case. From this exposure we estimate that the 360s F410M images of this field will include about 200 stellar point source images suitable for phase retrieval, with about 20 sources having > 20,000 e- in the peak pixel of the PSF.

Visit

Proposal 14425, 47 Tuc-HD2702 (P2) Wed Oct 21 01:58:35 GMT 2015

Diagnostic Status: Warning

Scientific Instruments: STIS/CCD, WFC3/UVIS, ACS/WFC

Special Requirements: SCHED 100%; ORIENT 255D TO 255 D; BEFORE 15-JUL-2016:00:00:00

Comments: Orient fixed to allow observations to match those obtained in program 14063 during June 2015
Since we're mixing up the parallel exposures in each group, we need to do each group separately with POS-TARGs instead of a PATTERN.
The X and Y POSTARG values below should match the dither box used for visit P1. Also see the comments included with the pattern definition.

-0.418275 -0.418275
0.139425 -0.139425
0.418275 0.418275
-0.139425 0.139425

Diagnostics

(47 Tuc-HD2702 (P2)) Warning (Orbit Planner): PARALLELS SIGNIFICANTLY EXTEND ALIGNMENT TIME

(47 Tuc-HD2702 (P2)) Warning (Orbit Planner): PARALLELS SIGNIFICANTLY EXTEND ALIGNMENT TIME

(Parallel F410M 360s (P2.004)) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser

(Parallel F410M 360s (P2.010)) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser

(Parallel F410M 360s (P2.015)) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser

(Parallel F410M 360s (P2.019)) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD2072	RA: 00 24 14.5080 (6.0604500d)	Proper Motion RA: 6.5 mas/yr	V=9.09+/-0.1	Reference Frame: ICRS
	Alt Name1: CL-STAR-NGC104-LEE-5701	Dec: -71 58 49.09 (-71.98030d)	Proper Motion Dec: -23.0 mas/yr	B=9.85; U=9.47; U=10.131; GALEX-NUV=12.13753; F336W=9.6	
		Equinox: J2000	Epoch of Position: 2000		
	Alt Name2: CD-72D21				

Comments: Target is a bright star near 47 Tuc.
Target is included WFC3 F275W, F336W, and F438W images (ibqf030b0, ibqf030a0, ibqf03090, respectively).
Appears to be a good point source, although magnitude estimated from slightly saturated F336W image (F336W=9.6 vegamag) is brighter than suggested by the published ground based U magnitude (10.131).

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(STIS.im712301)	(1) HD2072	STIS/CCD, ACCUM, F28X50OII	MIRROR	CR-SPLIT=NO; GAIN=4	POS TARG -0.418275,-0.418275; GS ACQ SCENARIO BASE1B3	Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2) Prime + Parallel Group 1-5 in Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2)	35 Secs X 2 (70 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
	Comments: Full frame image x2 *New WFPC2 estimate gives 9.47, so full well time drops to 37 s! STIS.im.712301*								
2	(STIS.im712301)	(1) HD2072	STIS/CCD, ACCUM, F28X50OII	MIRROR	CR-SPLIT=NO; GAIN=4; SIZEAXIS2=128	POS TARG -0.418275,-0.418275	Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2) Prime + Parallel Group 1-5 in Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2)	35 Secs X 2 (70 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
	Comments: Subarray image								
3	(STIS.im712301)	(1) HD2072	STIS/CCD, ACCUM, F28X50OII	MIRROR	CR-SPLIT=NO; GAIN=4; SIZEAXIS2=128	POS TARG -0.418275,-0.418275	Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2) Prime + Parallel Group 1-5 in Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2)	35 Secs X 2 (70 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
4	F410M 360s (WFC3UVIS.im.709909)	ANY	WFC3/UVIS, ACCUM, UVIS	F410M	CR-SPLIT=NO; FLASH=15		Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2) Prime + Parallel Group 1-5 in Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2)	360 Secs (360 Secs) *[==>]*	***[1]***
	Comments: Approach full well for giant branch stars near V=16, and useful focus estimates down to V=17 *Estimates suggest approximately 200 stars should provide useful focus estimates* *Extra deep flash was used on advice of WFC3 team*								
5	ACS 502N 200s (ACS.im.709912)	ANY	ACS/WFC, ACCUM, WFC	F502N	FLASH=100		Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2) Prime + Parallel Group 1-5 in Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2)	360 Secs (360 Secs) *[==>]*	***[1]***
	Comments: Exposure timed to allow bluer HB stars to be near full well. Some giant-branch stars will be saturated, but BOT suggests plenty of stars in well exposed but unsaturated range *Since we can get two full frame ACS parallels in this visit, we will do that rather than taking four subarray images.* *Extra deep FLASH=100 recommended by ACS team for observations of bright point sources with a narrow band filter.*								
6	(STIS.im.712301)	(1) HD2072	STIS/CCD, ACCUM, F28X50OII	MIRROR	CR-SPLIT=NO; GAIN=4	POS TARG 0.139425,-0.139425	Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2) Prime + Parallel Group 6-10 in Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2)	35 Secs X 2 (70 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
	Comments: Full frame image x2 *New WFPC2 estimate gives 9.47, so full well time drops to 37 s! STIS.im.712301*								

	7	(STIS.im.712301)	(1) HD2072	STIS/CCD, ACCUM, F28X50OII	MIRROR	CR-SPLIT=NO; GAIN=4; SIZEAXIS2=128	POS TARG 0.139425,-0.139425	Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2) Prime + Parallel Group 6-10 in Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2)	35 Secs X 2 (70 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
	8	(STIS.im.712301)	(1) HD2072	STIS/CCD, ACCUM, F28X50OII	MIRROR	CR-SPLIT=NO; GAIN=4; SIZEAXIS2=128	POS TARG 0.139425,-0.139425	Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2) Prime + Parallel Group 6-10 in Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2)	35 Secs X 2 (70 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
	Comments: Short 30 s safety exposures to be sure not to saturate target									
	9	(STIS.im.712301)	(1) HD2072	STIS/CCD, ACCUM, F28X50OII	MIRROR	CR-SPLIT=NO; GAIN=4; SIZEAXIS2=128	POS TARG 0.139425,-0.139425	Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2) Prime + Parallel Group 6-10 in Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2)	35 Secs X 2 (70 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
	10	F410M 360s (WFC3UVIS.im.709908)	ANY	WFC3/UVIS, ACCUM, UVIS	F410M	CR-SPLIT=NO; FLASH=15		Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2) Prime + Parallel Group 6-10 in Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2)	360 Secs (360 Secs) *[==>]*	***[1]***
	Comments: Deep F410M exposure. Full well for giant branch stars near V=15 *Extra deep flash was used on advice of WFC3 team*									
	11	(STIS.im.712301)	(1) HD2072	STIS/CCD, ACCUM, F28X50OII	MIRROR	CR-SPLIT=NO; GAIN=4	POS TARG 0.418275,0.418275	Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2) Prime + Parallel Group 11-15 in Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2)	35 Secs X 2 (70 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
	Comments: Full frame image x2 *New WFPC2 estimate gives 9.47, so full well time drops to 37 s! STIS.im.712301*									
	12	(STIS.im.712301)	(1) HD2072	STIS/CCD, ACCUM, F28X50OII	MIRROR	CR-SPLIT=NO; GAIN=4; SIZEAXIS2=128	POS TARG 0.418275,0.418275	Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2) Prime + Parallel Group 11-15 in Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2)	35 Secs X 2 (70 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
	13	(STIS.im.712301)	(1) HD2072	STIS/CCD, ACCUM, F28X50OII	MIRROR	CR-SPLIT=NO; GAIN=4; SIZEAXIS2=128	POS TARG 0.418275,0.418275	Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2) Prime + Parallel Group 11-15 in Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2)	35 Secs X 2 (70 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***

14	(STIS.im.712301)	(1) HD2072	STIS/CCD, ACCUM, F28X50OII	MIRROR	CR-SPLIT=NO; GAIN=4; SIZEAXIS2=128	POS TARG 0.418275,0.418275	Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2) Prime + Parallel Group 11-15 in Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2)	35 Secs X 2 (70 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*		***[1]***
15	F410M 360s (WFC3UVIS.im.709909)	ANY	WFC3/UVIS, ACCUM, UVIS	F410M	CR-SPLIT=NO; FLASH=15		Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2) Prime + Parallel Group 11-15 in Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2)	360 Secs (360 Secs) *[==>]*		***[1]***
Comments: Approach full well for giant branch stars near V=16, and useful focus estimates down to V=17 *Estimates suggest approximately 200 stars should provide useful focus estimates* *Extra deep flash was used on advice of WFC3 team*										
16	(STIS.im.712301)	(1) HD2072	STIS/CCD, ACCUM, F28X50OII	MIRROR	CR-SPLIT=NO; GAIN=4	POS TARG -0.139425,0.139425	Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2) Prime + Parallel Group 16-20 in Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2)	35 Secs X 2 (70 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*		***[1]***
Comments: Full frame image x2 *New WFPC2 estimate gives 9.47, so full well time drops to 37 s! STIS.im.712301*										
17	(STIS.im.712301)	(1) HD2072	STIS/CCD, ACCUM, F28X50OII	MIRROR	CR-SPLIT=NO; GAIN=4; SIZEAXIS2=128	POS TARG -0.139425,0.139425	Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2) Prime + Parallel Group 16-20 in Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2)	35 Secs X 2 (70 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*		***[1]***
18	(STIS.im.712301)	(1) HD2072	STIS/CCD, ACCUM, F28X50OII	MIRROR	CR-SPLIT=NO; GAIN=4; SIZEAXIS2=128	POS TARG -0.139425,0.139425	Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2) Prime + Parallel Group 16-20 in Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2)	35 Secs X 2 (70 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*		***[1]***
19	F410M 360s (WFC3UVIS.im.709908)	ANY	WFC3/UVIS, ACCUM, UVIS	F410M	CR-SPLIT=NO; FLASH=15		Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2) Prime + Parallel Group 16-20 in Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2)	360 Secs (360 Secs) *[==>]*		***[1]***
Comments: Deep F410M exposure. Full well for giant branch stars near V=15 *Extra deep flash was used on advice of WFC3 team*										

	20	ACS 502N 2 00s (ACS.im.709912)	ANY	ACS/WFC, ACCUM, WFC	F502N	FLASH=100	Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2) Prime + Parallel Group 16-20 in Sequence 1-20 Non-Int in 47 Tuc-HD2702 (P2)	360 Secs (360 Secs) *[==>]*	***[1]***

Comments: Exposure timed to allow bluer HB stars to be near full well. Some giant-branch stars will be saturated, but BOT suggests plenty of stars in well exposued but unsaturated range.
Since we can get two full frame ACS parallels in this visit, we will do that rather than taking four subarray images.
Extra deep FLASH=100 recommended by ACS team for observations of bright point sources with a narrow band filter.

Orbit Structure