# 16862 - Supplemental Empirical CTE Calibrations for Photometry and Astrometry

Cycle: 29, Proposal Category: CAL/WFC3

(Availability Mode: RESTRICTED)

**INVESTIGATORS**


| *Name* | *Institution* | *E-Mail* |
|---|---|---|
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**VISITS**

| *Visit* | *Targets used in Visit* | *Configurations used in Visit* | *Orbits Used* | *Last Orbit Planner Run* | *OP Current with Visit?* |
|---|---|---|---|---|---|
| 01 | (1) NGC-5139 | WFC3/UVIS | 2 | 14-Dec-2021 17:00:27.0 | yes |

2 Total Orbits Used

**ABSTRACT**


WFC3/ISR 2021-13 constructed table-based CTE corrections for photometry and astrometry for backgrounds between 5e and 30e. The astrometric corrections in that ISR were somewhat ad hoc, since the calibration observations were not optimized for astrometry (there were degeneracies at the bright-star end).

In this two-orbit program, we will (1) provide photometric corrections all the way up to 100e background, and (2) we will provide explicit astrometric corrections for all background levels, from 10e to 100e.

We will use the data collected in this program to update the table-based correction. We will put together a quick ISR to present the analysis and construct the table.

**OBSERVING DESCRIPTION**

This program will involve one two-orbit visit.

We will observe the center of Omega Centauri, taking advantage of its flat spatial distribution and its bottom-heavy brightness distribution. The observations will be taken in F502N, which allows efficient 339s exposures to get ~300 stars in the brightest unsaturated magnitude bin, 8000 stars in the S/N~100 magnitude bin, and 20,000 stars in the faint S/N~10 magnitude bin. We can get 6 such exposures per orbit, for a total of 12 exposures in the program. The natural background of these exposures should be about 10e.

We will take 4 exposures with a background of ~60e to provide the photometric and astrometric reference catalogs against which the other background will be measured: (1) one with the null post-targ (centered on the cluster), (2) one with a 1-chip dither upwards in y, (3) one with a -1-chip dither downwards in y, and another with a +0.5 chip dither upwards in y. The two full-dithered steps will allow us to calibrate directly the CTE-related photometric losses in both chips. From this, we will produce an acccurate photometric catalog of all the stars in both chips of the default pointing. The half-chip stepped exposures will allow assessment of the astrometic component of imperfect CTE, which shifts the apparent positions of stars away from the readout register (ie, towards the gap).

Since we can get 6 exposures per orbit and 12 total, this leaves us 8 exposures to probe additional backgrounds. We will take one with no postflash, which should probe a background of 10e (thanks to the cluster background), then we'll add 0.1s of MEDIUM current to get 17e, 24e, 31e, 38e, 45e, 52e, (59e), 73e, 80e, and 101e.

## Visit

**Proposal 16862, Visit 01** Tue Dec 14 22:00:28 GMT 2021

**Diagnostic Status: Warning**

Scientific Instruments: WFC3/UVIS

Special Requirements: BEFORE 01-JUN-2022:00:00:00

## Diagnostics

(BKGD059_PF049_PT+1.0 (01.001)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(BKGD059_PF049_PT+0.5 (01.002)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(BKGD010_PF000_PT0 (01.003)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(BKGD017_PF007_PT0 (01.004)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(BKGD024_PF014_PT0 (01.005)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(BKGD031_PF021_PT0 (01.006)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(BKGD059_PF049_PT-1.0 (01.007)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(BKGD059_PF049-PT0 (01.008)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(BKGD038_PF028_PT0 (01.009)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(BKGD045_PF035_PT0 (01.010)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(BKGD073_PF063_PT0 (01.011)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(BKGD101_PF091_PT0 (01.012)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

## Fixed Targets

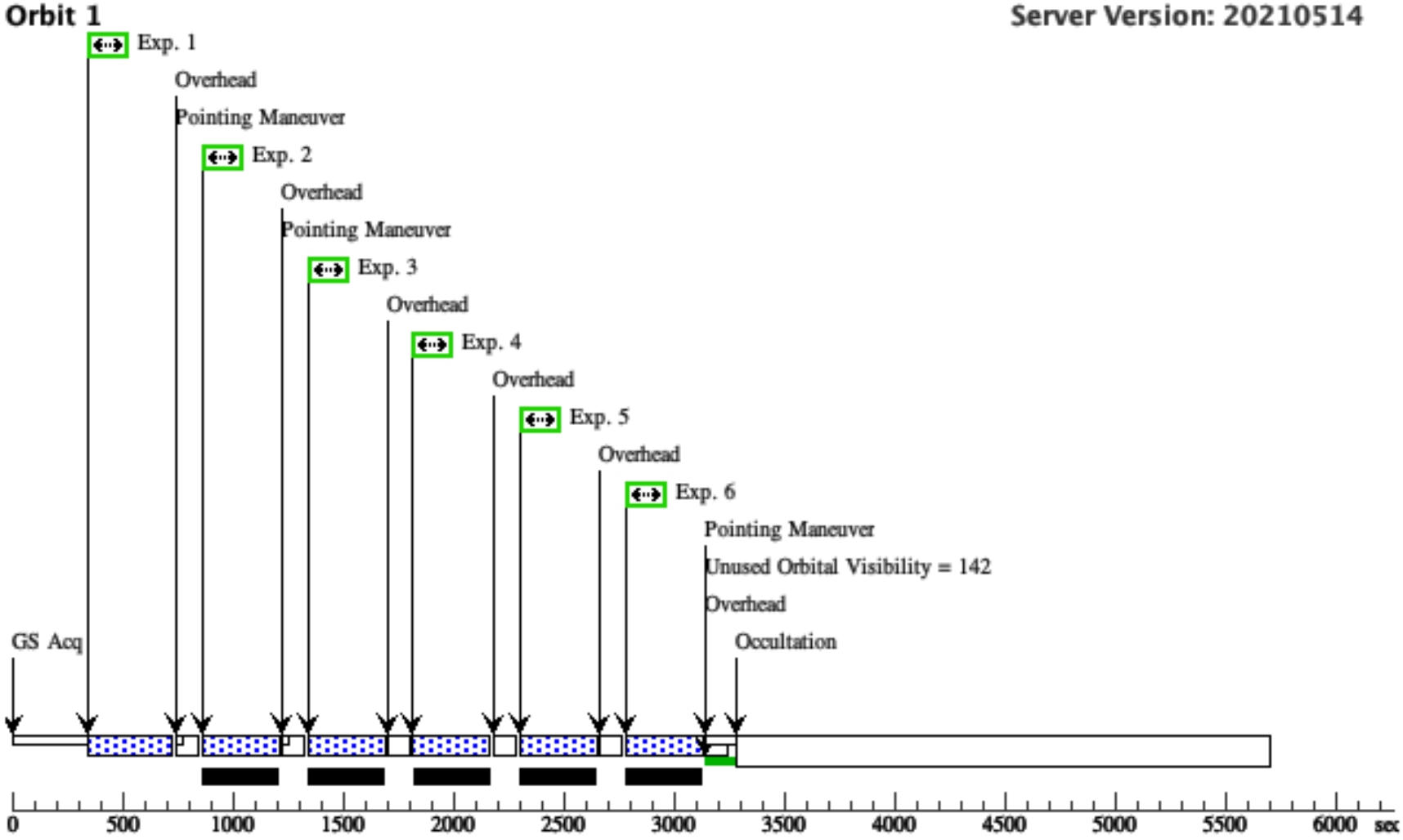
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | NGC-5139 | RA: 13 26 47.2400 (201.6968333d)<br>Dec: -47 28 46.45 (-47.47957d)<br>Equinox: J2000 | Proper Motion RA: -3.1959567280703653E-4 sec of time/yr<br>Proper Motion Dec: -0.006729999904564465 arcsec/yr<br>Epoch of Position: 2015.5 | V=5.33 | Reference Frame: SIMBAD |

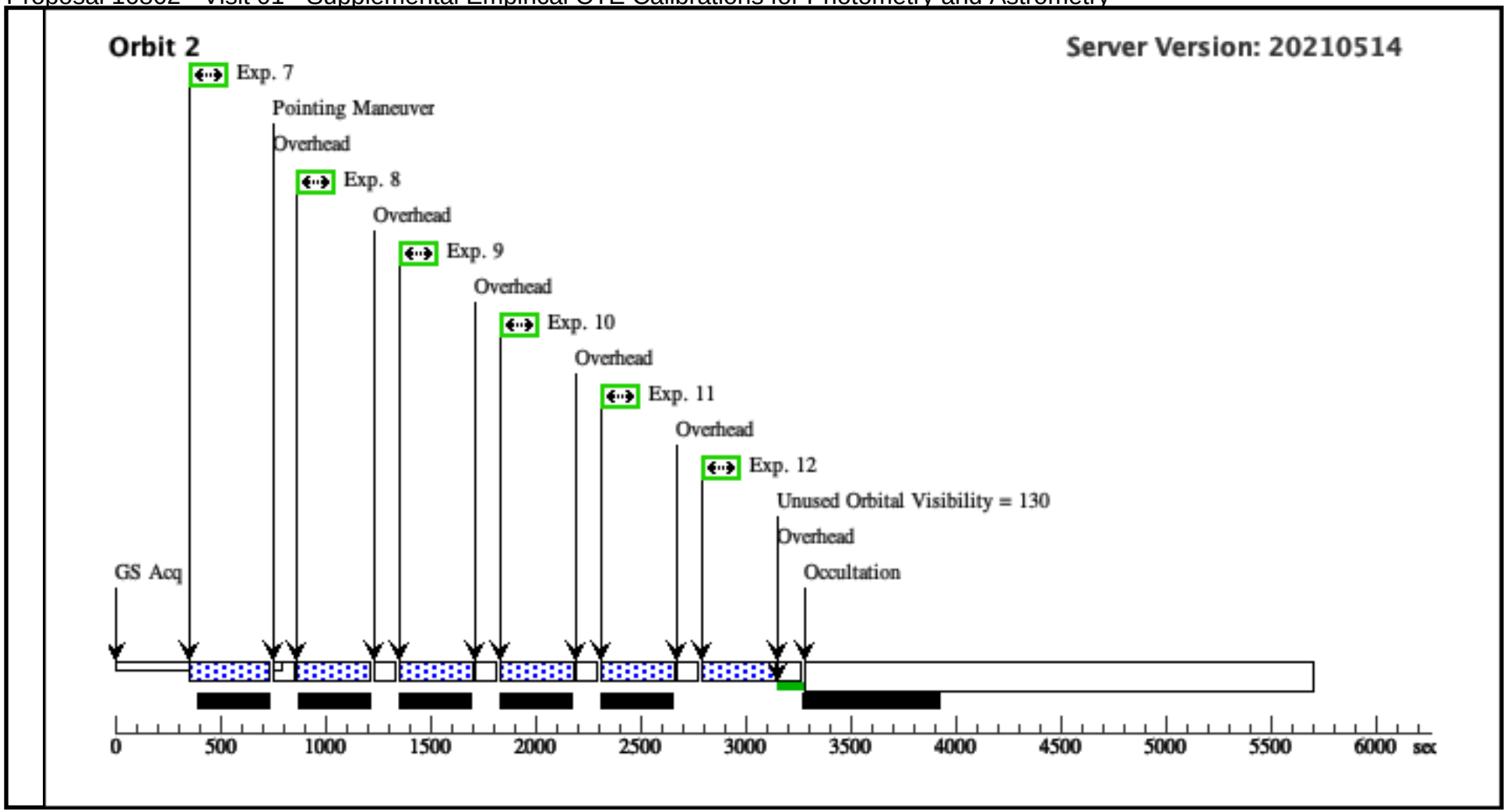
*Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.*
*Category=EXT-CLUSTER*
*Description=[GLOBULAR CLUSTER]*

**Exposures**

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | BKGD059_PF049_PT+1.0 | (1) NGC-5139 | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASHCUR=MEDIUM; FLASHEXP=0.7; GAIN=1.5 | POS TARG 0.0,81.6 | | 350 Secs (350 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 2 | BKGD059_PF049_PT+0.5 | (1) NGC-5139 | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASHCUR=MEDIUM; FLASHEXP=0.7; GAIN=1.5 | POS TARG 0.0,40.8 | | 350 Secs (350 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 3 | BKGD010_PF000_PT0 | (1) NGC-5139 | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | GAIN=1.5 | POS TARG 0.0,0.00 | | 350 Secs (350 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 4 | BKGD017_PF007_PT0 | (1) NGC-5139 | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASHCUR=MEDIUM; FLASHEXP=0.1; GAIN=1.5 | POS TARG null,0.0 | | 350 Secs (350 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 5 | BKGD024_PF014_PT0 | (1) NGC-5139 | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASHCUR=MEDIUM; FLASHEXP=0.2; GAIN=1.5 | | | 350 Secs (350 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 6 | BKGD031_PF021_PT0 | (1) NGC-5139 | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASHCUR=MEDIUM; FLASHEXP=0.3; GAIN=1.5 | POS TARG null,0.0 | | 350 Secs (350 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 7 | BKGD059_PF049_PT-1.0 | (1) NGC-5139 | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASHCUR=MEDIUM; FLASHEXP=0.7; GAIN=1.5 | POS TARG null,-81.6 | | 350 Secs (350 Secs) | |
| | | | | | | | | *[==>]* | ***[2]*** |
| 8 | BKGD059_PF049-PT0 | (1) NGC-5139 | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASHCUR=MEDIUM; FLASHEXP=0.7; GAIN=1.5 | | | 350 Secs (350 Secs) | |
| | | | | | | | | *[==>]* | ***[2]*** |
| 9 | BKGD038_PF028_PT0 | (1) NGC-5139 | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASHCUR=MEDIUM; FLASHEXP=0.4; GAIN=1.5 | | | 350 Secs (350 Secs) | |
| | | | | | | | | *[==>]* | ***[2]*** |
| 10 | BKGD045_PF035_PT0 | (1) NGC-5139 | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASHCUR=MEDIUM; FLASHEXP=0.5; GAIN=1.5 | | | 350 Secs (350 Secs) | |
| | | | | | | | | *[==>]* | ***[2]*** |
| 11 | BKGD073_PF063_PT0 | (1) NGC-5139 | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASHCUR=MEDIUM; FLASHEXP=0.9; GAIN=1.5 | | | 350 Secs (350 Secs) | |
| | | | | | | | | *[==>]* | ***[2]*** |
| 12 | BKGD101_PF091_PT0 | (1) NGC-5139 | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASHCUR=MEDIUM; FLASHEXP=1.3; GAIN=1.5 | | | 350 Secs (350 Secs) | |
| | | | | | | | | *[==>]* | ***[2]*** |

Orbit Structure




Orbit 2
Server Version: 20210514
Exp. 7
Pointing Maneuver
Overhead
Exp. 8
Overhead
Exp. 9
Overhead
Exp. 10
Overhead
Exp. 11
Overhead
Exp. 12
Unused Orbital Visibility = 130
Overhead
Occultation
GS Acq
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec