



17531 - Planetary Nebulae in Star Clusters: Testing Membership with High-Precision Proper Motions

Cycle: 31, Proposal Category: GO
(Availability Mode: SUPPORTED)

INVESTIGATORS

| <i>Name</i> | <i>Institution</i> |
|--|--|
| Dr. Howard E. Bond (PI) (Contact) | The Pennsylvania State University |
| Dr. Andrea Bellini (CoI) | Space Telescope Science Institute |
| Dr. Kailash C. Sahu (CoI) | Eureka Scientific Inc. |

VISITS

| <i>Visit</i> | <i>Targets used in Visit</i> | <i>Configurations used in Visit</i> | <i>Orbits Used</i> | <i>Last Orbit Planner Run</i> | <i>OP Current with Visit?</i> |
|--------------|------------------------------|-------------------------------------|--------------------|-------------------------------|-------------------------------|
| 01 | (1) BMP-J1613-5406 | WFC3/UVIS | 1 | 29-Jan-2024 12:00:16.0 | yes |
| 02 | (2) PHR-J1315-6555 | WFC3/UVIS | 1 | 29-Jan-2024 12:00:17.0 | yes |
| 03 | (3) JAFU-1 | WFC3/UVIS | 1 | 29-Jan-2024 12:00:18.0 | yes |

3 Total Orbits Used

ABSTRACT

Planetary nebulae (PNe) mark the rapid transition of low- to intermediate-mass stars from the AGB to the white-dwarf (WD) cooling sequence. PNe provide information on nucleosynthesis, mixing, mass loss, and the relation between a star's initial mass and that of its WD remnant. Even the very existence of a PN shows that its central star will not end life as a core-collapse supernova (CCSN).

Unfortunately, for the vast majority of PNe, the masses and compositions of their progenitor stars are unknown. The only exception is in the case of a

PN belonging to a star cluster. We propose to use precise astrometry, made possible by high-resolution HST imaging, to measure proper motions (PMs) of the central stars of three PNe that are candidate cluster members, and verify that the PMs agree with those of the clusters. Two of the PNe may belong to young open clusters, and one to an ancient globular cluster (GC). One of the open clusters, NGC 6067, is only 90 Myr old, implying an unusually high progenitor mass of 5.6 M_{sun} (and a firm lower mass limit for CCSN progenitors). Another PN is a possible member of the GC Pal 6. Single-star evolution theory does not predict the existence of PNe in GCs, so that interacting-binary scenarios are needed--if the PN can be shown to be a cluster member.

For two of our targets, there are archival first-epoch HST images available. In these cases, a one-orbit second-epoch observation will allow determinations of extremely precise PMs, and thus stringent tests of membership. For the PN candidate in NGC 6067, we propose first-epoch WFC3 images in Cycle 31, and a second epoch in Cycle 33, making it possible to confirm its unusually massive progenitor.

OBSERVING DESCRIPTION

We propose WFC3/UVIS imaging of the central stars of three PNe that are candidate members of three star clusters. Two of the clusters are open clusters, and one is a globular cluster. The aim is to measure precise proper motions (PMs) of the central stars, and of cluster members, in order to test whether the PNe are physical members of the clusters.

1. BMP J1613 in NGC 6067. There are no archival HST images of this target. We will obtain one orbit of imaging in Cycle 31, and a second one-orbit visit in Cycle 33.

Bellini et al. (2014), Sahu et al. (2017, 2022), Libralato et al. (2019), and other authors, have demonstrated an astrometric precision of better than 0.02 pixel (± 0.8 mas) per exposure can be achieved with WFC3/UVIS for well-exposed stellar images. WFC3 is increasingly affected by CTE. However, a correction algorithm, developed by Anderson (2021), can improve the precision to about 0.01 pixel if we place the target near the amplifier edge on the CCD. The uncertainty reduces to about ± 0.14 mas at a single epoch by combining 8 dithered exposures (possible during a one-orbit visit using subarrays). Thus the PM uncertainty over a 2-year interval would be ± 0.10 mas yr⁻¹. Hence it is readily possible with WFC3 astrometry to exceed the precision of the Gaia PM for this faint star by more than an order of magnitude (see the error bars in Fig. 2). This will provide an acid test of the PNN's cluster membership.

We will use the F606W (wide V) filter. This filter gives the best count rate for the central star. The F606W filter has an extremely well-characterised PSF for precision astrometry (e.g., Sahu et al. 2022 and references therein). (Note that our source is too faint, and the surrounding field too crowded, to use the technique of spatial-scanning astrometry developed by Riess et al. 2014.)

Proposal 17531 (STScI Edit Number: 0, Created: Monday, January 29, 2024 at 12:00:18 PM Eastern Standard Time) - Overview

For the central star of BMP J1613, the WFC3 Exposure Time Calculator indicates that a SNR=100 exposure takes 60 sec. We will use a dither-box pattern, and obtain 8 exposures of 60 sec each. The orbit will be filled out with a single 60-sec exposure in F814W, in order to measure the colour of the central star to help constrain its effective temperature and reddening (and increase the archival value of our data). All exposures will be pre-flashed, to further mitigate effects of CTE (e.g., Kuhn & Bajaj 2021).

The surrounding field will provide the astrometric frame. Gaia DR3 indicates that, for example, there are about three dozen stars in a 81x81 arcsec field centred on the target, with magnitudes in the range $17 < G < 18$. These bright stars will be well-exposed but not saturated in the WFC3 frames, providing a robust frame of stars with well-known PMs (including a handful of cluster members). This will allow us to determine the PM of the central star to high precision, and calibrated to the Gaia absolute frame.

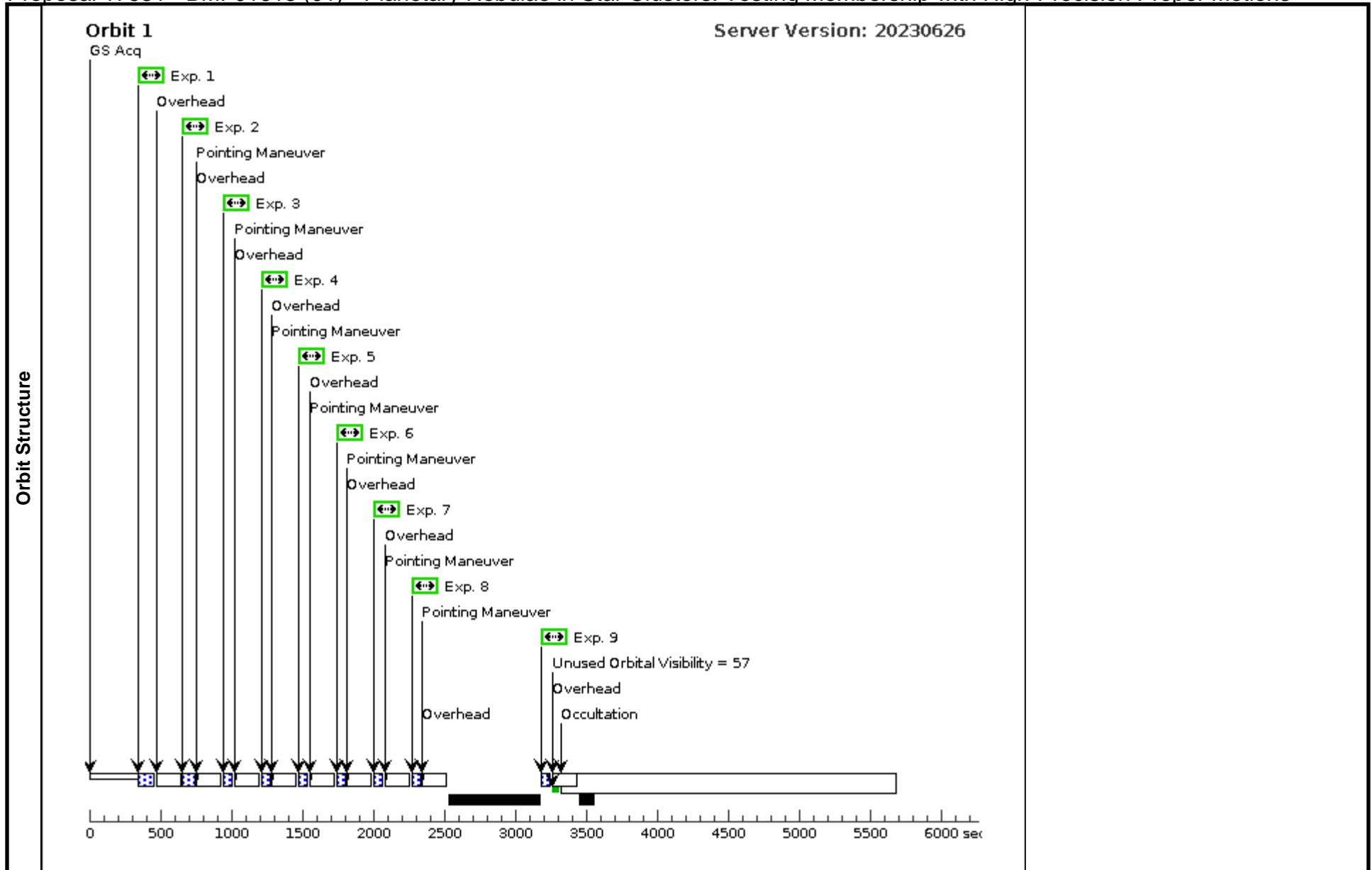
2. PHR J1315 in AL 1 and JaFu 1 in Pal 3. For both of these targets, there are archival first-epoch HST frames. During Cycle 31, we will obtain the second-epoch frames for PM determination, one orbit each for the two targets. We will use WFC3/UVIS imaging essentially identical to that just described for BMPJ1613, but using the same filters as in the first-epoch frames.

Total request: Three orbits in Cycle 31, one orbit in Cycle 33.

Proposal 17531 - BMPJ1613 (01) - Planetary Nebulae in Star Clusters: Testing Membership with High-Precision Proper Motions

Mon Jan 29 17:00:18 GMT 2024

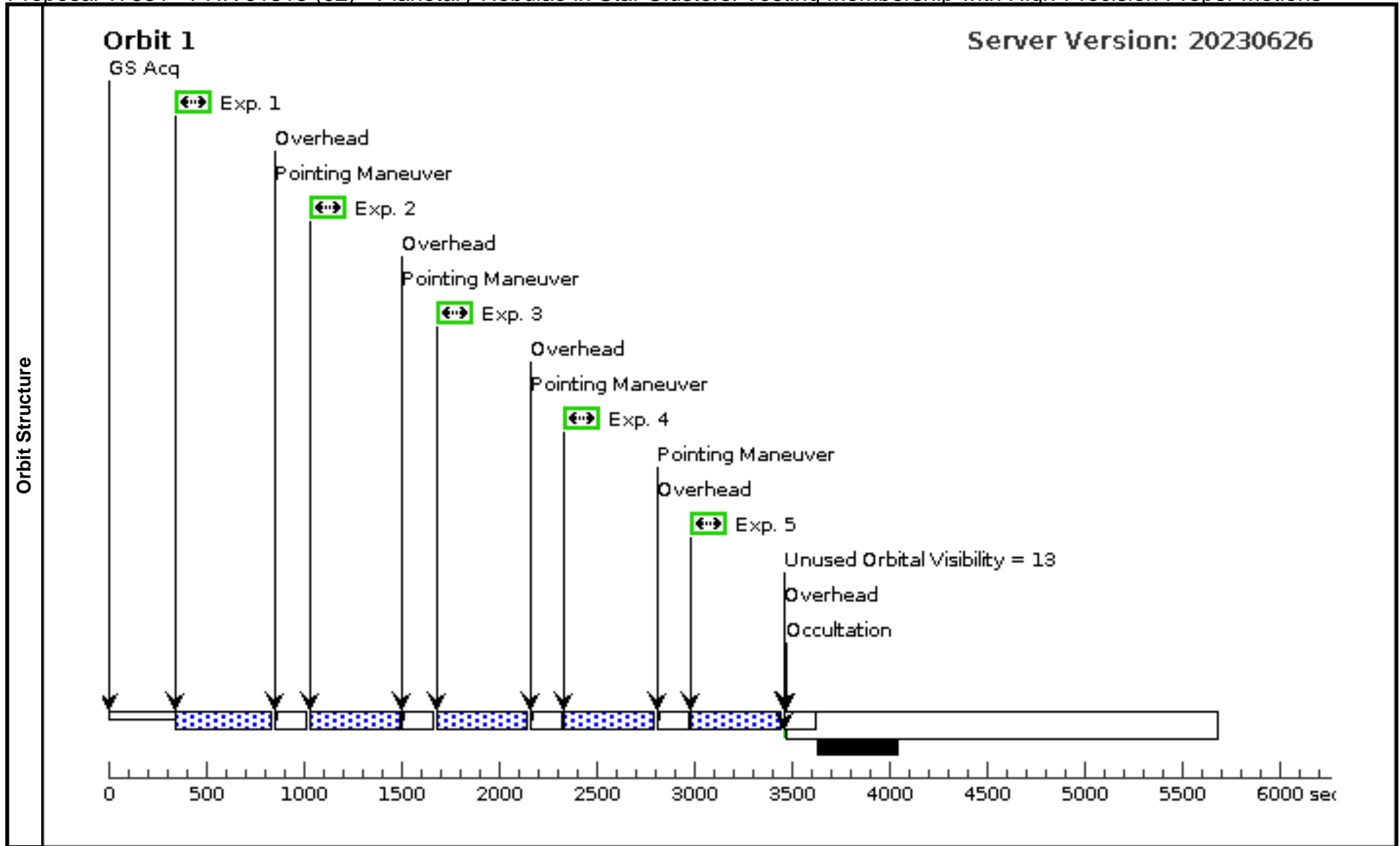
| Visit | Proposal 17531, BMPJ1613 (01), implementation Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: BEFORE 28-FEB-2024 | | | | | | | | | | |
|---|--|--|----------------------------------|---|----------------------------------|-----------------------|-----------------------|----------------------------|----------------------------|---------------------------------|-------|
| | Diagnostics | (Exposure 1 (BMPJ1613 (01))) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser (Exposure 2 (BMPJ1613 (01))) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser (Exposure 3 (BMPJ1613 (01))) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser (Exposure 4 (BMPJ1613 (01))) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser (Exposure 5 (BMPJ1613 (01))) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser (Exposure 6 (BMPJ1613 (01))) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser (Exposure 7 (BMPJ1613 (01))) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser (Exposure 8 (BMPJ1613 (01))) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser (Exposure 9 (BMPJ1613 (01))) 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) | BMP-J1613-5406 | RA: 16 13 2.0384 (243.2584933d) Dec: -54 06 32.28 (-54.10897d) Equinox: J2000 | Epoch of Position: 2000.0 | V=20.2+/-0.5 | Reference Frame: ICRS | | | | |
| Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Coords are from Gaia DR3. Category=STAR Description=[CIRCUMSTELLAR MATTER, EJECTA, PLANETARY NEBULA CENTRAL STAR] | | | | | | | | | | | |
| Exposures | | # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
| | | 1 | (1) BMP-J1613-5406 | (1) BMP-J1613-5406 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F814W | CR-SPLIT=NO; FLASH=40 | POS TARG 10.40,9.00 | | 80 Secs (80 Secs) [==>] | [1] |
| | | 2 | (1) BMP-J1613-5406 | (1) BMP-J1613-5406 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F606W | CR-SPLIT=NO; FLASH=40 | SAME POS AS 1 | | 65 Secs (65 Secs) [==>] | [1] |
| | | 3 | (1) BMP-J1613-5406 | (1) BMP-J1613-5406 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F606W | CR-SPLIT=NO; FLASH=40 | POS TARG 14.35,9.00 | | 65 Secs (65 Secs) [==>] | [1] |
| | | 4 | (1) BMP-J1613-5406 | (1) BMP-J1613-5406 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F606W | CR-SPLIT=NO; FLASH=40 | POS TARG 12.86,12.09 | | 65 Secs (65 Secs) [==>] | [1] |
| | 5 | (1) BMP-J1613-5406 | (1) BMP-J1613-5406 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F606W | CR-SPLIT=NO; FLASH=40 | POS TARG 9.51,12.85 | | 65 Secs (65 Secs) [==>] | [1] | |
| | 6 | (1) BMP-J1613-5406 | (1) BMP-J1613-5406 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F606W | CR-SPLIT=NO; FLASH=40 | POS TARG 6.83,10.70 | | 65 Secs (65 Secs) [==>] | [1] | |
| | 7 | (1) BMP-J1613-5406 | (1) BMP-J1613-5406 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F606W | CR-SPLIT=NO; FLASH=40 | POS TARG 6.85,7.27 | | 65 Secs (65 Secs) [==>] | [1] | |
| | 8 | (1) BMP-J1613-5406 | (1) BMP-J1613-5406 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F606W | CR-SPLIT=NO; FLASH=40 | POS TARG 9.54,5.14 | | 65 Secs (65 Secs) [==>] | [1] | |
| 9 | (1) BMP-J1613-5406 | (1) BMP-J1613-5406 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F606W | CR-SPLIT=NO; FLASH=40 | POS TARG 12.89,5.93 | | 65 Secs (65 Secs) [==>] | [1] | | |



Proposal 17531 - PHR J1315 (02) - Planetary Nebulae in Star Clusters: Testing Membership with High-Precision Proper Motions

Mon Jan 29 17:00:18 GMT 2024

| Visit | Proposal 17531, PHR J1315 (02), scheduling Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: ORIENT 135D TO 145 D; ORIENT 225D TO 235 D; ORIENT 315D TO 325 D; ORIENT 45D TO 55 D | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---------------------------|--------------------------|--------------------------|---------------------|---------------|---------------------------------|----------------|---|---------------------------|--------------|-----------------------|--|---------------------------------|-------|---|--------------------|----------------------------------|-------|-----------------------|---------------------|---------------------|-------|-----|---|--------------------|----------------------------------|-------|-----------------------|---------------------|---------------------|-------|-----|---|--------------------|----------------------------------|-------|-----------------------|----------------------|---------------------|-------|-----|---|--------------------|----------------------------------|-------|-----------------------|--------------------|---------------------|-------|-----|---|--------------------|----------------------------------|-------|-----------------------|---------------------|---------------------|-------|-----|
| | (Exposure 1 (PHR J1315 (02))) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser (Exposure 2 (PHR J1315 (02))) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser (Exposure 3 (PHR J1315 (02))) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser (Exposure 4 (PHR J1315 (02))) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser (Exposure 5 (PHR J1315 (02))) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Fixed Targets | <table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Fluxes</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(2)</td> <td>PHR-J1315-6555</td> <td>RA: 13 15 18.7460 (198.8281083d) Dec: -65 55 1.08 (-65.91697d) Equinox: J2000</td> <td>Epoch of Position: 2015.5</td> <td>V=24.5+/-0.5</td> <td>Reference Frame: ICRS</td> </tr> </tbody> </table> | # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous | (2) | PHR-J1315-6555 | RA: 13 15 18.7460 (198.8281083d) Dec: -65 55 1.08 (-65.91697d) Equinox: J2000 | Epoch of Position: 2015.5 | V=24.5+/-0.5 | Reference Frame: ICRS | <i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Coordinates updated from archival HST images.</i> Category=STAR Description=[CIRCUMSTELLAR MATTER, EJECTA, PLANETARY NEBULA CENTRAL STAR] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (2) | PHR-J1315-6555 | RA: 13 15 18.7460 (198.8281083d) Dec: -65 55 1.08 (-65.91697d) Equinox: J2000 | Epoch of Position: 2015.5 | V=24.5+/-0.5 | Reference Frame: ICRS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>#</th> <th>Label</th> <th>Target</th> <th>Config,Mode,Aperture</th> <th>Spectral Els.</th> <th>Opt. Params.</th> <th>Special Reqs.</th> <th>Groups</th> <th>Exp. Time (Total)/[Actual Dur.]</th> <th>Orbit</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>(2) PHR-J1315-6555</td> <td>WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB</td> <td>F555W</td> <td>CR-SPLIT=NO; FLASH=18</td> <td>POS TARG 10.40,9.00</td> <td>465 Secs (465 Secs)</td> <td>[==>]</td> <td>[1]</td> </tr> <tr> <td>2</td> <td>(2) PHR-J1315-6555</td> <td>WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB</td> <td>F555W</td> <td>CR-SPLIT=NO; FLASH=18</td> <td>POS TARG 14.35,9.00</td> <td>465 Secs (465 Secs)</td> <td>[==>]</td> <td>[1]</td> </tr> <tr> <td>3</td> <td>(2) PHR-J1315-6555</td> <td>WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB</td> <td>F555W</td> <td>CR-SPLIT=NO; FLASH=18</td> <td>POS TARG 10.39,12.95</td> <td>465 Secs (465 Secs)</td> <td>[==>]</td> <td>[1]</td> </tr> <tr> <td>4</td> <td>(2) PHR-J1315-6555</td> <td>WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB</td> <td>F555W</td> <td>CR-SPLIT=NO; FLASH=18</td> <td>POS TARG 6.45,8.98</td> <td>465 Secs (465 Secs)</td> <td>[==>]</td> <td>[1]</td> </tr> <tr> <td>5</td> <td>(2) PHR-J1315-6555</td> <td>WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB</td> <td>F555W</td> <td>CR-SPLIT=NO; FLASH=18</td> <td>POS TARG 10.43,5.05</td> <td>465 Secs (465 Secs)</td> <td>[==>]</td> <td>[1]</td> </tr> </tbody> </table> | | | | | | | # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit | 1 | (2) PHR-J1315-6555 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F555W | CR-SPLIT=NO; FLASH=18 | POS TARG 10.40,9.00 | 465 Secs (465 Secs) | [==>] | [1] | 2 | (2) PHR-J1315-6555 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F555W | CR-SPLIT=NO; FLASH=18 | POS TARG 14.35,9.00 | 465 Secs (465 Secs) | [==>] | [1] | 3 | (2) PHR-J1315-6555 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F555W | CR-SPLIT=NO; FLASH=18 | POS TARG 10.39,12.95 | 465 Secs (465 Secs) | [==>] | [1] | 4 | (2) PHR-J1315-6555 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F555W | CR-SPLIT=NO; FLASH=18 | POS TARG 6.45,8.98 | 465 Secs (465 Secs) | [==>] | [1] | 5 | (2) PHR-J1315-6555 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F555W | CR-SPLIT=NO; FLASH=18 | POS TARG 10.43,5.05 | 465 Secs (465 Secs) | [==>] | [1] |
| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | (2) PHR-J1315-6555 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F555W | CR-SPLIT=NO; FLASH=18 | POS TARG 10.40,9.00 | 465 Secs (465 Secs) | [==>] | [1] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | (2) PHR-J1315-6555 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F555W | CR-SPLIT=NO; FLASH=18 | POS TARG 14.35,9.00 | 465 Secs (465 Secs) | [==>] | [1] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | (2) PHR-J1315-6555 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F555W | CR-SPLIT=NO; FLASH=18 | POS TARG 10.39,12.95 | 465 Secs (465 Secs) | [==>] | [1] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | (2) PHR-J1315-6555 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F555W | CR-SPLIT=NO; FLASH=18 | POS TARG 6.45,8.98 | 465 Secs (465 Secs) | [==>] | [1] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | (2) PHR-J1315-6555 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F555W | CR-SPLIT=NO; FLASH=18 | POS TARG 10.43,5.05 | 465 Secs (465 Secs) | [==>] | [1] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Proposal 17531 - JaFu 1 (03) - Planetary Nebulae in Star Clusters: Testing Membership with High-Precision Proper Motions

Mon Jan 29 17:00:18 GMT 2024

| Visit | Proposal 17531, JaFu 1 (03), scheduling Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: (none) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------|--|------------|----------------------------------|---------------|-----------------------|----------------------|--------|---------------------------------|----------------------|---------------|--------------|---------------|--------|---------------------------------|-------|---|------------|------------|----------------------------------|-------|-----------------------|---------------------|--|------------------------------|-----|---|------------|------------|----------------------------------|-------|-----------------------|---------------------|--|------------------------------|-----|---|------------|------------|----------------------------------|-------|-----------------------|----------------------|--|------------------------------|-----|---|------------|------------|----------------------------------|-------|-----------------------|---------------------|--|------------------------------|-----|---|------------|------------|----------------------------------|-------|-----------------------|--------------------|--|------------------------------|-----|---|------------|------------|----------------------------------|-------|-----------------------|---------------------|--|------------------------------|-----|---|------------|------------|----------------------------------|-------|-----------------------|---------------|--|------------------------------|-----|---|------------|------------|----------------------------------|-------|-----------------------|---------------|--|------------------------------|
| | (Exposure 1 (JaFu 1 (03))) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser (Exposure 2 (JaFu 1 (03))) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser (Exposure 3 (JaFu 1 (03))) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser (Exposure 4 (JaFu 1 (03))) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser (Exposure 5 (JaFu 1 (03))) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser (Exposure 6 (JaFu 1 (03))) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser (Exposure 7 (JaFu 1 (03))) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser (Exposure 8 (JaFu 1 (03))) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Diagnostics | # Name Target Coordinates Targ. Coord. Corrections Fluxes Miscellaneous (3) JAFU-1 RA: 17 43 57.2390 (265.9884958d) Dec: -26 11 53.82 (-26.19828d) Equinox: J2000 Epoch of Position: 2015.5 V=20.9+/-0.5 Reference Frame: ICRS Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Coordinates updated from archival HST frames. Category=STAR Description=[CIRCUMSTELLAR MATTER, EJECTA, PLANETARY NEBULA CENTRAL STAR] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>#</th> <th>Label</th> <th>Target</th> <th>Config,Mode,Aperture</th> <th>Spectral Els.</th> <th>Opt. Params.</th> <th>Special Reqs.</th> <th>Groups</th> <th>Exp. Time (Total)/[Actual Dur.]</th> <th>Orbit</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>(3) JAFU-1</td> <td>(3) JAFU-1</td> <td>WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB</td> <td>F555W</td> <td>CR-SPLIT=NO; FLASH=38</td> <td>POS TARG 10.40,9.00</td> <td></td> <td>120 Secs (120 Secs) [==>]</td> <td>[1]</td> </tr> <tr> <td>2</td> <td>(3) JAFU-1</td> <td>(3) JAFU-1</td> <td>WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB</td> <td>F555W</td> <td>CR-SPLIT=NO; FLASH=38</td> <td>POS TARG 14.35,9.00</td> <td></td> <td>120 Secs (120 Secs) [==>]</td> <td>[1]</td> </tr> <tr> <td>3</td> <td>(3) JAFU-1</td> <td>(3) JAFU-1</td> <td>WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB</td> <td>F555W</td> <td>CR-SPLIT=NO; FLASH=38</td> <td>POS TARG 11.61,12.76</td> <td></td> <td>120 Secs (120 Secs) [==>]</td> <td>[1]</td> </tr> <tr> <td>4</td> <td>(3) JAFU-1</td> <td>(3) JAFU-1</td> <td>WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB</td> <td>F555W</td> <td>CR-SPLIT=NO; FLASH=38</td> <td>POS TARG 7.20,11.31</td> <td></td> <td>120 Secs (120 Secs) [==>]</td> <td>[1]</td> </tr> <tr> <td>5</td> <td>(3) JAFU-1</td> <td>(3) JAFU-1</td> <td>WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB</td> <td>F555W</td> <td>CR-SPLIT=NO; FLASH=38</td> <td>POS TARG 7.22,6.66</td> <td></td> <td>120 Secs (120 Secs) [==>]</td> <td>[1]</td> </tr> <tr> <td>6</td> <td>(3) JAFU-1</td> <td>(3) JAFU-1</td> <td>WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB</td> <td>F555W</td> <td>CR-SPLIT=NO; FLASH=38</td> <td>POS TARG 11.65,5.25</td> <td></td> <td>120 Secs (120 Secs) [==>]</td> <td>[1]</td> </tr> <tr> <td>7</td> <td>(3) JAFU-1</td> <td>(3) JAFU-1</td> <td>WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB</td> <td>F656N</td> <td>CR-SPLIT=NO; FLASH=25</td> <td>SAME POS AS 6</td> <td></td> <td>300 Secs (300 Secs) [==>]</td> <td>[1]</td> </tr> <tr> <td>8</td> <td>(3) JAFU-1</td> <td>(3) JAFU-1</td> <td>WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB</td> <td>F656N</td> <td>CR-SPLIT=NO; FLASH=25</td> <td>SAME POS AS 1</td> <td></td> <td>300 Secs (300 Secs) [==>]</td> <td>[1]</td> </tr> </tbody> </table> | | | | | # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit | 1 | (3) JAFU-1 | (3) JAFU-1 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F555W | CR-SPLIT=NO; FLASH=38 | POS TARG 10.40,9.00 | | 120 Secs (120 Secs) [==>] | [1] | 2 | (3) JAFU-1 | (3) JAFU-1 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F555W | CR-SPLIT=NO; FLASH=38 | POS TARG 14.35,9.00 | | 120 Secs (120 Secs) [==>] | [1] | 3 | (3) JAFU-1 | (3) JAFU-1 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F555W | CR-SPLIT=NO; FLASH=38 | POS TARG 11.61,12.76 | | 120 Secs (120 Secs) [==>] | [1] | 4 | (3) JAFU-1 | (3) JAFU-1 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F555W | CR-SPLIT=NO; FLASH=38 | POS TARG 7.20,11.31 | | 120 Secs (120 Secs) [==>] | [1] | 5 | (3) JAFU-1 | (3) JAFU-1 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F555W | CR-SPLIT=NO; FLASH=38 | POS TARG 7.22,6.66 | | 120 Secs (120 Secs) [==>] | [1] | 6 | (3) JAFU-1 | (3) JAFU-1 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F555W | CR-SPLIT=NO; FLASH=38 | POS TARG 11.65,5.25 | | 120 Secs (120 Secs) [==>] | [1] | 7 | (3) JAFU-1 | (3) JAFU-1 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F656N | CR-SPLIT=NO; FLASH=25 | SAME POS AS 6 | | 300 Secs (300 Secs) [==>] | [1] | 8 | (3) JAFU-1 | (3) JAFU-1 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F656N | CR-SPLIT=NO; FLASH=25 | SAME POS AS 1 | | 300 Secs (300 Secs) [==>] |
| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | (3) JAFU-1 | (3) JAFU-1 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F555W | CR-SPLIT=NO; FLASH=38 | POS TARG 10.40,9.00 | | 120 Secs (120 Secs) [==>] | [1] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | (3) JAFU-1 | (3) JAFU-1 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F555W | CR-SPLIT=NO; FLASH=38 | POS TARG 14.35,9.00 | | 120 Secs (120 Secs) [==>] | [1] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | (3) JAFU-1 | (3) JAFU-1 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F555W | CR-SPLIT=NO; FLASH=38 | POS TARG 11.61,12.76 | | 120 Secs (120 Secs) [==>] | [1] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | (3) JAFU-1 | (3) JAFU-1 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F555W | CR-SPLIT=NO; FLASH=38 | POS TARG 7.20,11.31 | | 120 Secs (120 Secs) [==>] | [1] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | (3) JAFU-1 | (3) JAFU-1 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F555W | CR-SPLIT=NO; FLASH=38 | POS TARG 7.22,6.66 | | 120 Secs (120 Secs) [==>] | [1] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | (3) JAFU-1 | (3) JAFU-1 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F555W | CR-SPLIT=NO; FLASH=38 | POS TARG 11.65,5.25 | | 120 Secs (120 Secs) [==>] | [1] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | (3) JAFU-1 | (3) JAFU-1 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F656N | CR-SPLIT=NO; FLASH=25 | SAME POS AS 6 | | 300 Secs (300 Secs) [==>] | [1] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | (3) JAFU-1 | (3) JAFU-1 | WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB | F656N | CR-SPLIT=NO; FLASH=25 | SAME POS AS 1 | | 300 Secs (300 Secs) [==>] | [1] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

