# 16498 - A STIS look at ASASSN-14ko: a recently discovered periodic nuclear transient with rapid FUV evolution

Cycle: 28, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

**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) ASASSN-14KO | STIS/CCD<br>STIS/FUV-MAMA | 2 | 15-Mar-2021 14:00:12.0 | yes |
| 02 | (1) ASASSN-14KO | STIS/CCD<br>STIS/FUV-MAMA | 2 | 15-Mar-2021 14:00:13.0 | yes |

4 Total Orbits Used

**ABSTRACT**

ASASSN-14ko is a recently discovered, periodically flaring, nuclear transient within known AGN ESO 253-G003. The flares have a mean period of ~114 days and a nonzero, negative period derivative. The exact origin of these UV/optical flares is currently unknown. STIS UV observations of the rise, peak, and decline in the UV revealed rapid and dramatic evolution in Dec 2020 showing strong P Cygni profiles in the FUV for C IV and N V that rapidly changed. The UV spectra during all of the epochs substantially differ from any tidal disruption event (TDE) with UV spectroscopic observations and also differ from any AGN/quasar spectrum the proposers are familiar with. The rapid evolution itself is also unprecedented for TDEs which thus far have exhibited static or slowly evolving UV spectra. Most intriguing is that the appearance of the P Cygni profiles appears to correlate with X-ray diminings which are consistent with being due to obscuration. Combining the X-ray and STIS observations for the Dec flare a consistent picture of a rapid outflow, possibly a tidal stream, is emerging. Here we propose for 2 additional early-time STIS spectra covering the earliest phases of ASASSN-14ko's April 2021 outburst. These observations will bring into focus these dramatic spectroscopic and X-rays changes.

**OBSERVING DESCRIPTION**

The impact of reduced-gyro operations on this project are uncertain, but, given that the epochs of these observations are highly constrained it is likely that the effect will be to further constrain or eliminate some of the epochs.

## Visit

**Proposal 16498, Epoch 5 (01), implementation** Mon Mar 15 18:00:14 GMT 2021

**Diagnostic Status: No Diagnostics**

Scientific Instruments: STIS/CCD, STIS/FUV-MAMA

Special Requirements: BETWEEN 29-MAR-2021:12:00:00 AND 30-MAR-2021:12:00:00

*Comments: Quiescence before ASASSN-14ko Dec 2020 outburst*

## Patterns

| # | Primary Pattern | | Secondary Pattern | Exposures |
|---|---|---|---|---|
| (2) | Pattern Type=STIS-ALONG-SLIT | Coordinate Frame=POS-TARG | | (2) |
| | Purpose=DITHER | Pattern Orientation=90.0 | | |
| | Number Of Points=3 | Angle Between Sides= | | |
| | Point Spacing=0.3829 | Center Pattern=false | | |
| | Line Spacing= | | | |

## Fixed Targets

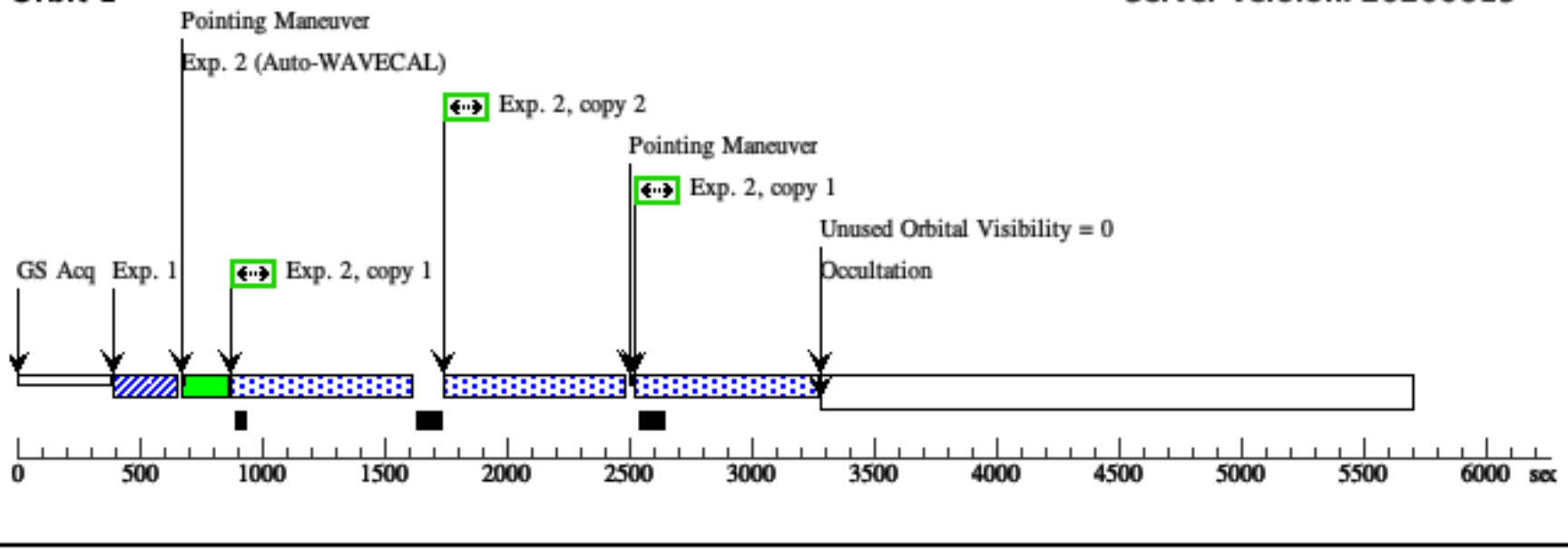
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | ASASSN-14KO | RA: 05 25 18.1170 (81.3254875d) | Epoch of Position: 2015.5 | V=14.5+/-0.2 | Reference Frame: ICRS |
| | | Dec: -46 00 20.23 (-46.00562d) | Redshift: 0.042489 | at peak: W1=15.69(0.04), | |
| | | Equinox: J2000 | | M2=15.66(0.07), | |
| | | | | and W2=15.64(0.04) | |

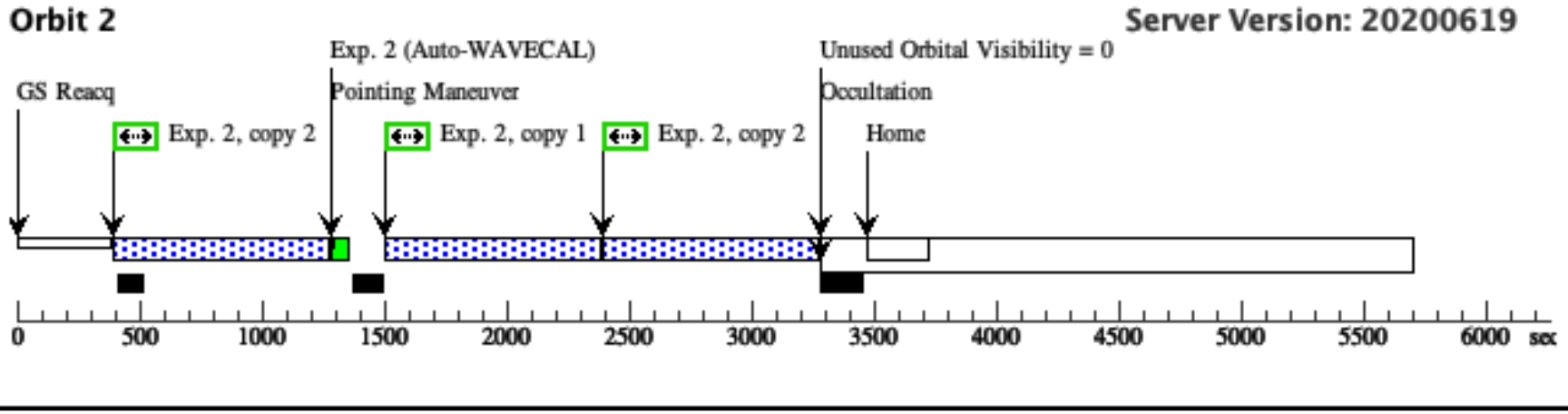
*Comments: Note, this is the nucleaus of a galaxy, but, it is a complex galaxy. Please see submission notes.*
*Category=GALAXY*
*Description=[ACCRETION DISK, MULTIPLE NUCLEI, NUCLEUS, QUASAR]*

## Exposures

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | (STIS.ta.1472418) | (1) ASASSN-14KO | STIS/CCD, ACQ, 50CCD | MIRROR | | | | 5 Secs (5 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 2 | (STIS.sp.1472413) | (1) ASASSN-14KO | STIS/FUV-MAMA, ACCUM, 52X0.2 | G140L 1425 A | | | Pattern 2, Exps 2-2 in Epoch 5 (01) (2) | 500 Secs X 2 (4801 Secs) | |
| | | | | | | | | *[==>734.0 Secs (Pattern 1, Copy 1)]* | ***[1]*** |
| | | | | | | | | *[==>734.0 Secs (Pattern 1, Copy 2)]* | |
| | | | | | | | | *[==>735.0 Secs (Pattern 2, Copy 1)]* | |
| | | | | | | | | *[==>866.0 Secs (Pattern 2, Copy 2)]* | ***[2]*** |
| | | | | | | | | *[==>866.0 Secs (Pattern 3, Copy 1)]* | |
| | | | | | | | | *[==>866.0 Secs (Pattern 3, Copy 2)]* | |

Orbit Structure



## Visit

**Proposal 16498, Epoch 6 (02), implementation** Mon Mar 15 18:00:14 GMT 2021

**Diagnostic Status: No Diagnostics**

Scientific Instruments: STIS/CCD, STIS/FUV-MAMA

Special Requirements: SCHED 90%; AFTER 01 BY 2.25 D TO 3.25 D

*Comments: Rise of ASASSN-14ko Dec 2020 outburst*

## Patterns

| # | Primary Pattern | | Secondary Pattern | Exposures |
|---|---|---|---|---|
| (2) | Pattern Type=STIS-ALONG-SLIT | Coordinate Frame=POS-TARG | | (2) |
| | Purpose=DITHER | Pattern Orientation=90.0 | | |
| | Number Of Points=3 | Angle Between Sides= | | |
| | Point Spacing=0.3829 | Center Pattern=false | | |
| | Line Spacing= | | | |

## Fixed Targets

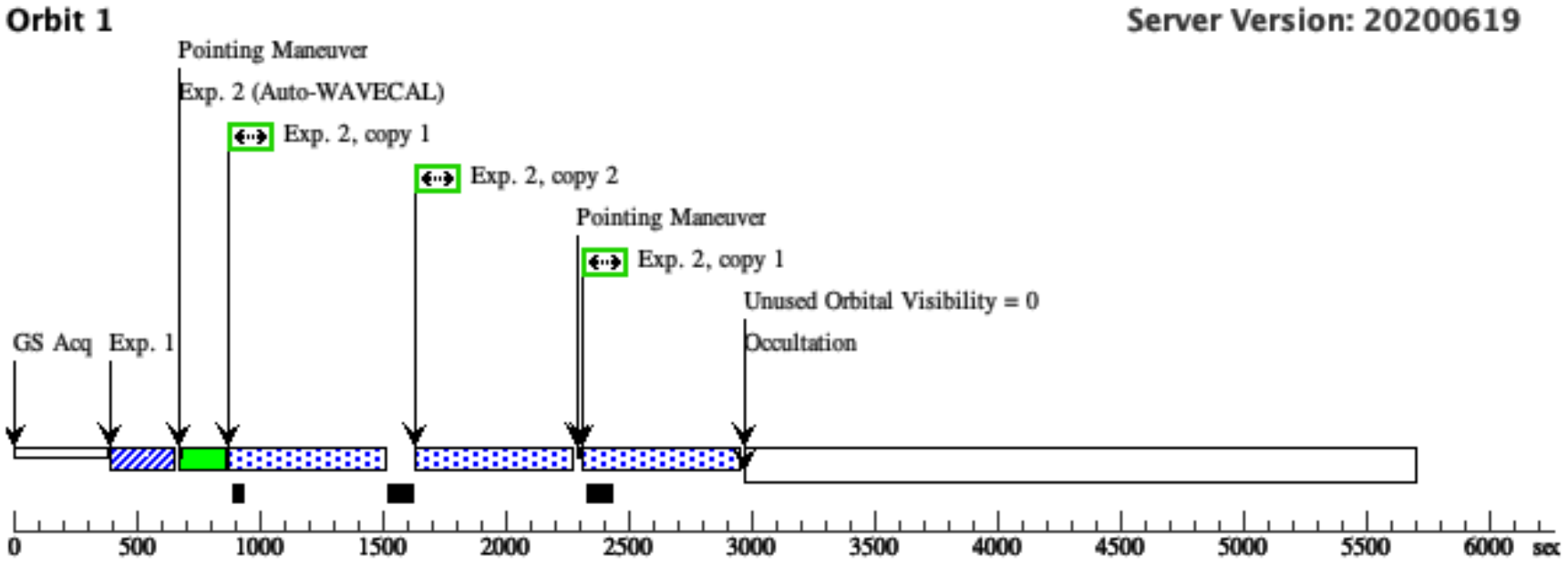
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | ASASSN-14KO | RA: 05 25 18.1170 (81.3254875d) | Epoch of Position: 2015.5 | V=14.5+/-0.2 | Reference Frame: ICRS |
| | | Dec: -46 00 20.23 (-46.00562d) | Redshift: 0.042489 | at peak: W1=15.69(0.04), | |
| | | Equinox: J2000 | | M2=15.66(0.07), | |
| | | | | and W2=15.64(0.04) | |

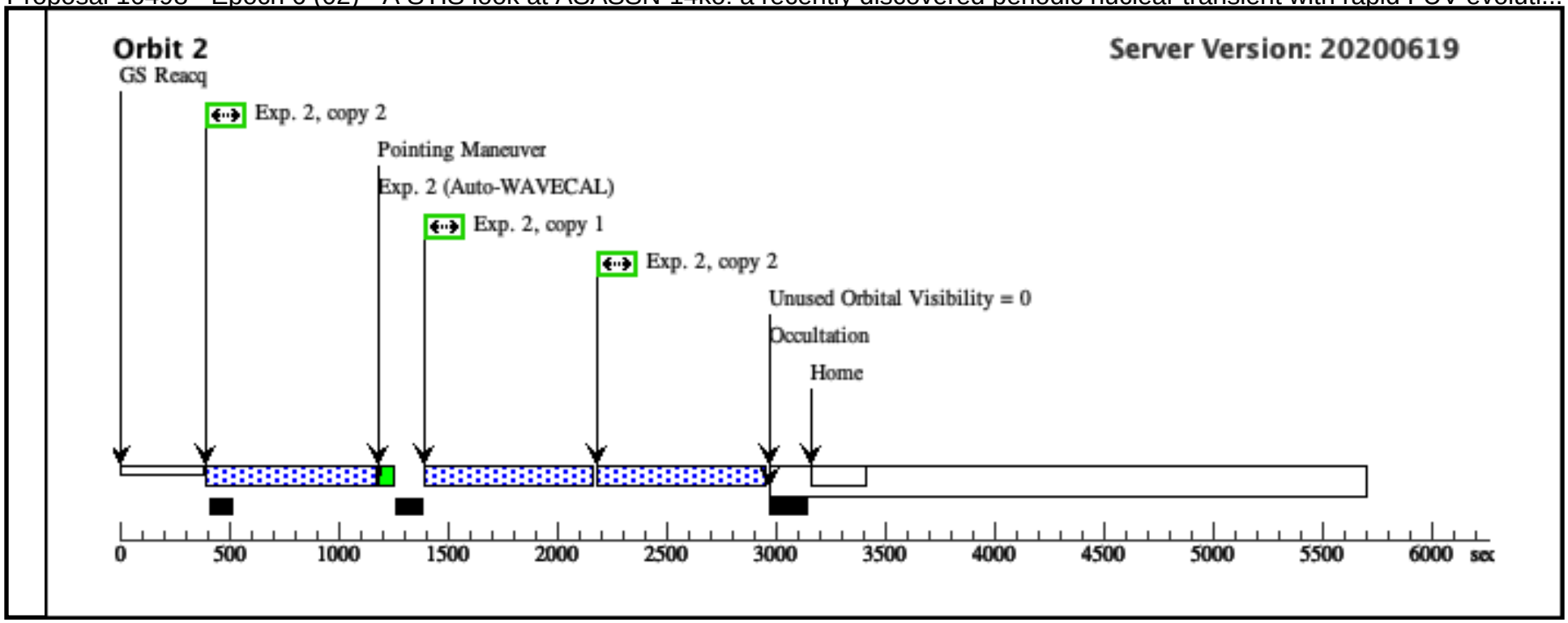
*Comments: Note, this is the nucleaus of a galaxy, but, it is a complex galaxy. Please see submission notes.*
*Category=GALAXY*
*Description=[ACCRETION DISK, MULTIPLE NUCLEI, NUCLEUS, QUASAR]*

## Exposures

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | (STIS.ta.1472418) | (1) ASASSN-14KO | STIS/CCD, ACQ, 50CCD | MIRROR | | | | 5 Secs (5 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 2 | (STIS.sp.826568) | (1) ASASSN-14KO | STIS/FUV-MAMA, ACCUM, 52X0.2 | G140L 1425 A | | | Pattern 2, Exps 2-2 in Epoch 6 (02) (2) | 500 Secs X 2 (4177 Secs) | |
| | | | | | | | | *[==>630.0 Secs (Pattern 1, Copy 1)]* | ***[1]*** |
| | | | | | | | | *[==>630.0 Secs (Pattern 1, Copy 2)]* | |
| | | | | | | | | *[==>631.0 Secs (Pattern 2, Copy 1)]* | |
| | | | | | | | | *[==>762.0 Secs (Pattern 2, Copy 2)]* | ***[2]*** |
| | | | | | | | | *[==>762.0 Secs (Pattern 3, Copy 1)]* | |
| | | | | | | | | *[==>762.0 Secs (Pattern 3, Copy 2)]* | |

**Orbit Structure**

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GS Reacq
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Pointing Maneuver
Exp. 2 (Auto-WAVECAL)
Exp. 2, copy 1
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Unused Orbital Visibility = 0
Occultation
Home
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500
1000
1500
2000
2500
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3500
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4500
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6000
sec