16759 - Obtaining the UV Reddening Curve of Extreme-Rv Highly Polarizing Dust Irradiated by Zeta Ophiuchi

Cycle: 29, Proposal Category: GO

(Availability Mode: SUPPORTED)

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?*
01	(1) PK2021-04	STIS/CCD STIS/NUV-MAMA	1	07-Jul-2022 21:00:16.0	yes
02	(2) PK2021-13	STIS/CCD STIS/NUV-MAMA	1	07-Jul-2022 21:00:17.0	yes
03	(3) PK2021-24	STIS/CCD STIS/NUV-MAMA	1	07-Jul-2022 21:00:17.0	yes
04	(4) PK2021-26	STIS/CCD STIS/NUV-MAMA	1	07-Jul-2022 21:00:18.0	yes
05	(5) PK2021-27	STIS/CCD STIS/NUV-MAMA	1	07-Jul-2022 21:00:18.0	yes

5 Total Orbits Used

ABSTRACT

Extinction and polarization by interstellar dust taints astrophysical signals, frustrating precision measurement of cosmological standard candles, electromagnetic components of multimessenger transients, and CMB signals. Understanding the origins of dust variations on small angular scales and along the line of sight in true three-dimensional detail, as informed by local physical influences, is now both possible and pressing. We propose STIS 1600-3100 A spectroscopy of five background stars probing a diffuse cloud irradiated by the O9.2IV star Zeta Oph, the nearest (182 pc) high-UV environment. Our optical polarization measurements along these mid-latitude low-confusion sightlines reveal a B field aligned with 8-micron bright filaments. The ratio of polarization to color excess, P/E(B-V), exceeds the empirical (Serkowski) limit of 9, indicating very efficient polarization and a high degree of grain alignment, plausibly from spin-up by radiative torques. The optical/infrared data indicate a reddening curve characteristic of R_V=A_V/E(B-V)<2.4, a signature of extreme dust and a size distribution favoring small grains. With measurement of the near-UV reddening slope, the height and width of the 2175 A bump, and potentially the far-UV rise, we will be able to forge a compelling association between extinction curve morphology, polarization efficiency, grain magnetic field alignment, and the dominant radiative influence of a well-characterized hot star. Characterizing the extinction of high-polarization low-Rv PAH-emitting grains in this local laboratory promotes understanding the conditions that produce anomalous dust in AGN, SNe, GRBs, and starbursts further afield.

OBSERVING DESCRIPTION

We are conducting STIS G230L spectroscopy covering 1570-3180 Angstroms to obtain spectrophotometry over a broad bandpass with the maximum possible sensitivity, hence, using a large slit. Exposure times vary from 1360 s to 3270 s per star for each of 5 stars. A total of 5 orbits was allocated.

Visit

Proposal 16759, Visit 01, implementation

Fri Jul 08 01:00:18 GMT 2022

Diagnostic Status: No Diagnostics

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

Special Requirements: (none)

Fixed Targets

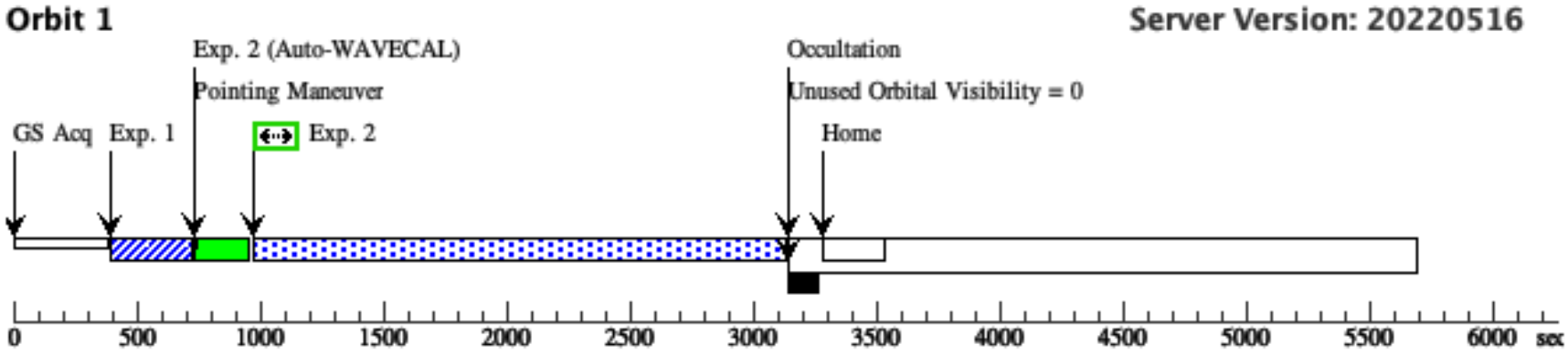
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	PK2021-04	RA: 16 36 24.8476 (249.1035317d) Dec: -10 32 39.55 (-10.54432d) Equinox: J2000	Proper Motion RA: -25.07 mas/yr Proper Motion Dec: -23.89 mas/yr Epoch of Position: 2015.5	V=12.19+/-0.01	Reference Frame: ICRS

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[G III-I, G V-IV]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ1	(1) PK2021-04	STIS/CCD, ACQ, F25ND3	MIRROR				9 Secs (9 Secs) *[==>]*	*[1]*
2	Exp1-targ1-04 (STIS.sp.15 23547)	(1) PK2021-04	STIS/NUV-MAMA, ACCUM, 52X2	G230L 2376 A				2125 Secs (2125 Secs) *[==>]*	*[1]*

Orbit Structure



Visit

Proposal 16759, Visit 02, implementation

Fri Jul 08 01:00:19 GMT 2022

Diagnostic Status: No Diagnostics

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

Special Requirements: (none)

Fixed Targets

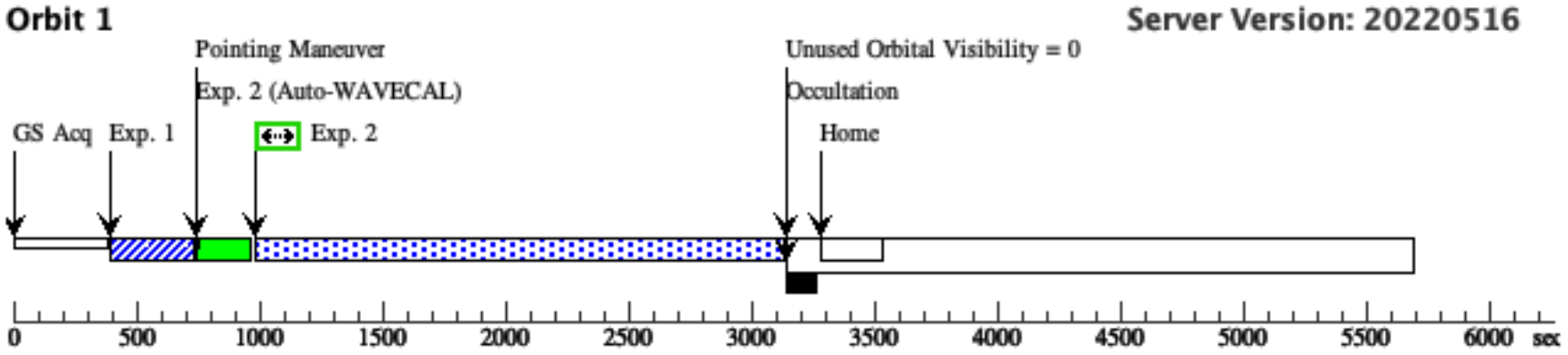
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	PK2021-13	RA: 16 36 56.8080 (249.2367000d) Dec: -10 29 13.56 (-10.48710d) Equinox: J2000	Proper Motion RA: 1.80 mas/yr Proper Motion Dec: -8.27 mas/yr Epoch of Position: 2016	V=12.32+/-0.01	Reference Frame: ICRS

Comments:
Category=STAR
Description=[F3-F9]

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ2	(2) PK2021-13	STIS/CCD, ACQ, F25ND3	MIRROR				12 Secs (12 Secs) *[==>]*	*[1]*
2	Exp1-targ2-13 (STIS.sp.15 23549)	(2) PK2021-13	STIS/NUV-MAMA, ACCUM, 52X2	G230L 2376 A				2113 Secs (2113 Secs) *[==>]*	*[1]*

Orbit Structure



Visit

Proposal 16759, Visit 03, implementation

Fri Jul 08 01:00:19 GMT 2022

Diagnostic Status: No Diagnostics

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

Special Requirements: (none)

Fixed Targets

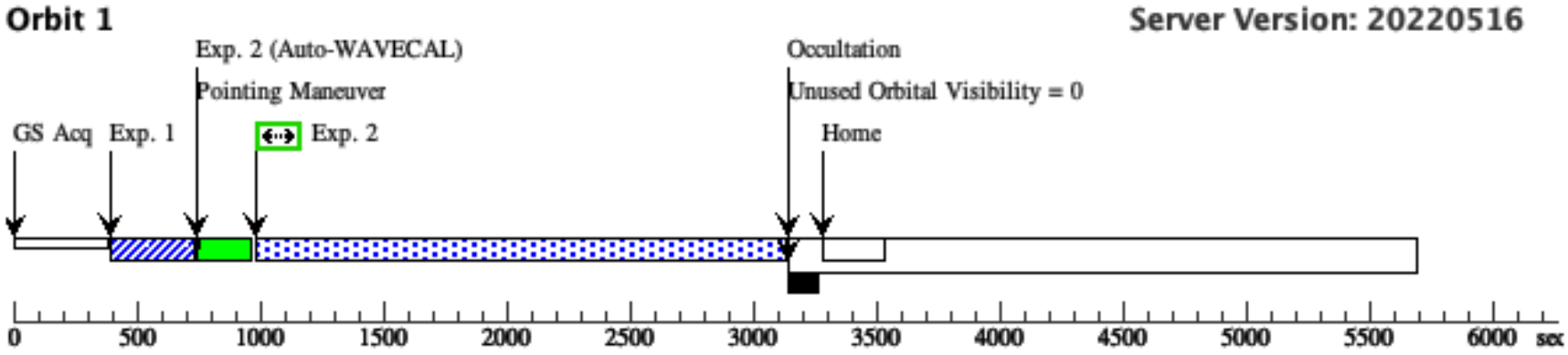
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	PK2021-24	RA: 16 37 50.8080 (249.4617000d) Dec: -10 33 6.84 (-10.55190d) Equinox: J2000	Proper Motion RA: -21.07 mas/yr Proper Motion Dec: 9.04 mas/yr Epoch of Position: 2016	V=12.20+/-0.01	Reference Frame: ICRS

Comments:
Category=STAR
Description=[G III-I, G V-IV]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ3	(3) PK2021-24	STIS/CCD, ACQ, F25ND3	MIRROR				12 Secs (12 Secs) *[==>]*	 ***[1]***
2	Exp1-targ3-24 (STIS.sp.15 23613)	(3) PK2021-24	STIS/NUV-MAMA, ACCUM, 52X2	G230L 2376 A				2113 Secs (2113 Secs) *[==>]*	 ***[1]***

Orbit Structure



Visit

Proposal 16759, Visit 04, implementation

Fri Jul 08 01:00:19 GMT 2022

Diagnostic Status: No Diagnostics

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

Special Requirements: (none)

Fixed Targets

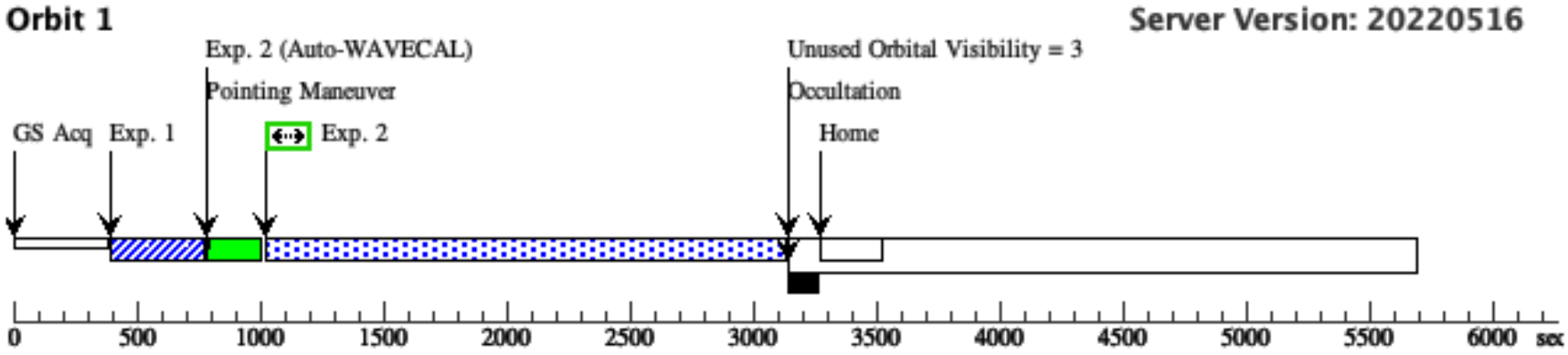
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	PK2021-26	RA: 16 38 1.1760 (249.5049000d) Dec: -10 34 46.92 (-10.57970d) Equinox: J2000	Proper Motion RA: 1.20 mas/yr Proper Motion Dec: -8.32 mas/yr Epoch of Position: 2016	V=13.06+/-0.01	Reference Frame: ICRS

Comments:
Category=STAR
Description=[F3-F9]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ4	(4) PK2021-26	STIS/CCD, ACQ, F25ND3	MIRROR				22 Secs (22 Secs) *[==>]*	 ***[1]***
2	EXP1-targ4-26 (STIS.sp.15 23576)	(4) PK2021-26	STIS/NUV-MAMA, ACCUM, 52X2	G230L 2376 A				2070 Secs (2070 Secs) *[==>]*	 ***[1]***

Orbit Structure



Visit

Proposal 16759, Visit 05, implementation

Fri Jul 08 01:00:19 GMT 2022

Diagnostic Status: No Diagnostics

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

Special Requirements: (none)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(5)	PK2021-27	RA: 16 38 2.5920 (249.5108000d) Dec: -10 28 7.68 (-10.46880d) Equinox: J2000	Proper Motion RA: 10.65 mas/yr Proper Motion Dec: -3.05 mas/yr Epoch of Position: 2016	V=12.95+/-0.01	Reference Frame: ICRS

Comments:
Category=STAR
Description=[F3-F9]

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ5	(5) PK2021-27	STIS/CCD, ACQ, F25ND3	MIRROR				22 Secs (22 Secs) *[==>]*	*[1]*
2	Exp1-targ5-27 (STIS.sp.15 23578)	(5) PK2021-27	STIS/NUV-MAMA, ACCUM, 52X2	G230L 2376 A				2063 Secs (2063 Secs) *[==>]*	*[1]*

Orbit Structure