17096 - Linking the UV Bump with PAHs in Low Metallicity Starburst II Zw 40

Cycle: 30, Proposal Category: GO

(UV Initiative)

(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) UGCA-116	ACS/SBC	2	03-Oct-2022 07:00:38.0	yes
02	(1) UGCA-116	WFC3/UVIS	2	03-Oct-2022 07:00:39.0	yes
03	(1) UGCA-116	WFC3/UVIS	1	03-Oct-2022 07:00:39.0	yes

5 Total Orbits Used

ABSTRACT

We proposed to explore the connection between the 2175 angstrom UV bump and the Polycyclic Aromatic Hydrocarbons (PAHs) together with the cluster properties in a prototypical blue compact dwarf II Zw 40 using the FUV-NUV-optical filters F140LP, F225W, and F438W. The debate on what the carriers of the UV bump are is still unsettled, but PAH is one of the most plausible candidates. II Zw 40 has one of the highest star formation rate densities in the local Universe and has been found to exhibit strong 3.3 micron emission powered by the smallest PAHs. Our

observation will take the advantage of the scheduled JWST GO1 program and use it as a supplement to showcase the combined power of the HST UV imaging and JWST IFUs to achieve our goal. Blue compact dwarf allows us to study starburst phenomena in the early Universe since they serve as powerful low-z, spatially resolvable analogs to high-z galaxies. Using HST multi-band imaging, we will constrain the strength of the UV bump and compare it with the spatially resolved dust properties in the IR revealed by JWST's IFUs. With our observation, we will also make possible a complete inventory of star clusters in II Zw 40 to further study cluster formation and evolution in this galaxy. There are existing archival HST UV data but they are not deep enough to meet our scientific objective. Our proposed program will obtain a much deeper UV mapping of II Zw 40 so that the amplitude of the UV bump can be better constrained. In total, we request 5 orbits of the HST observing time.

OBSERVING DESCRIPTION

HST images will be obtained using the ACS/SBC F140LP and WFC3/UVIS F225W and F438W filters. The exposure time for each filter is estimated using the HST ETC. For each filter, we use 4 point dithering with a post flash of 20 e-. The SED used in the ETC is 5 Myr old simple stellar population with Z_sun=0.4 from (Bruzual & Charlot, 2003). A set of the available HST archival data, including STIS F25QTZ and F25CN270 together with ACS F555W, is used to set the spectral normalize point for the exposure time estimation. The proposed observations will allow us to achieve a SNR>7 in the faintest clusters visible in the STIS image (see Sect. Justify Duplication for detail). We request 2 orbits in each of the F140LP and F225W filter to obtain deep UV images and 1 orbit for the optical filter F438W. Note that if these faint clusters are younger, their spectral energy distributions peak even higher in the bluer filters, and would be 1-2 magnitudes brighter than described above. In total, we request 5 orbits targeting II Zw 40 in this program.

Proposal 17096 - Visit 01 - Linking the UV Bump with PAHs in Low Metallicity Starburst II Zw 40

Visit

Proposal 17096, Visit 01, implementation Mon Oct 03 11:00:40 GMT 2022

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-SBC-DITHER-BOX	Coordinate Frame=POS-TARG		(1)
	Purpose=DITHER	Pattern Orientation=20.02		
	Number Of Points=4	Angle Between Sides=63.65		
	Point Spacing=0.179	Center Pattern=false		
	Line Spacing=0.116			

Fixed Targets

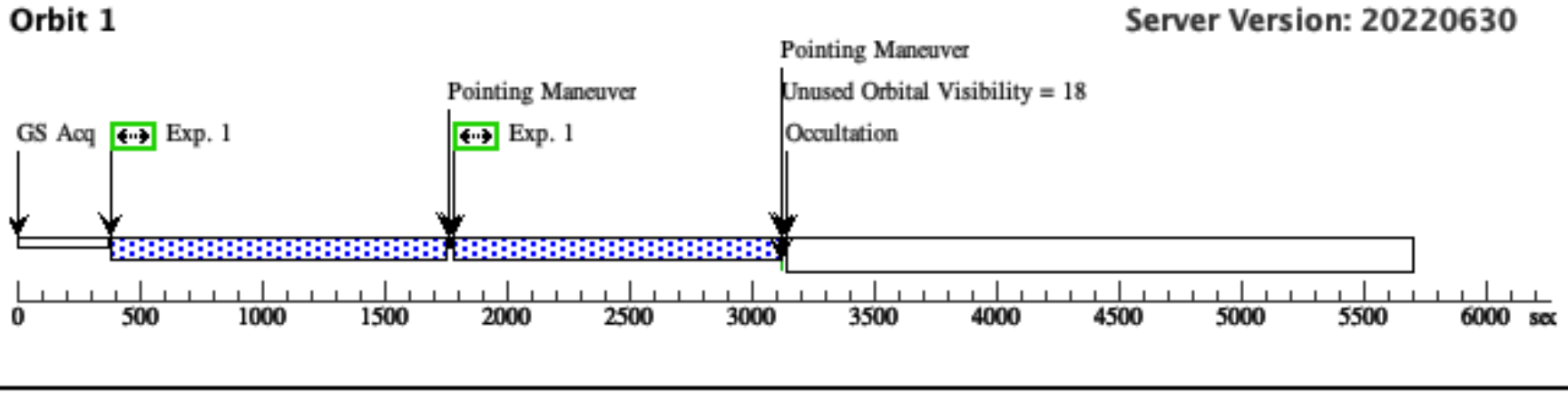
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	UGCA-116	RA: 05 55 42.6450 (88.9276875d)	Epoch of Position: 2015.5	V=11.46	Reference Frame: SIMBAD
		Dec: +03 23 32.23 (3.39229d)			
		Equinox: J2000			

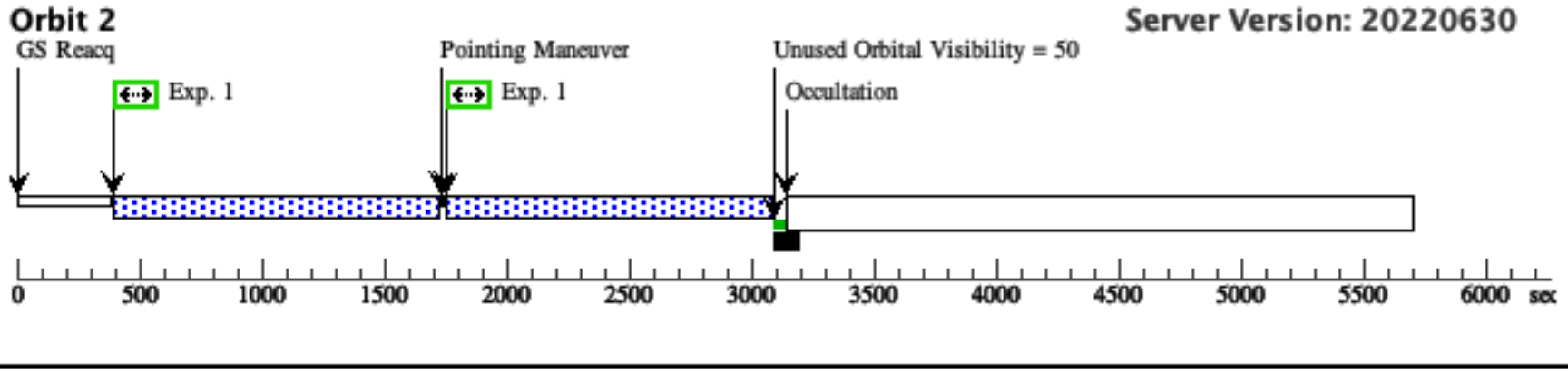
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=GALAXY
Description=[STARBURST]

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(1813666)	(1) UGCA-116	ACS/SBC, ACCUM, SBC	F140LP			Pattern 1, Exps 1-1 in Visit 01 (1)	1300 Secs (5200 Secs)	
								[==>(Pattern 1)]	***[1]***
								[==>(Pattern 2)]	
								[==>(Pattern 3)]	***[2]***
								[==>(Pattern 4)]	

Orbit Structure





Visit

Proposal 17096, Visit 02, implementation Mon Oct 03 11:00:40 GMT 2022

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false		(1)

Fixed Targets

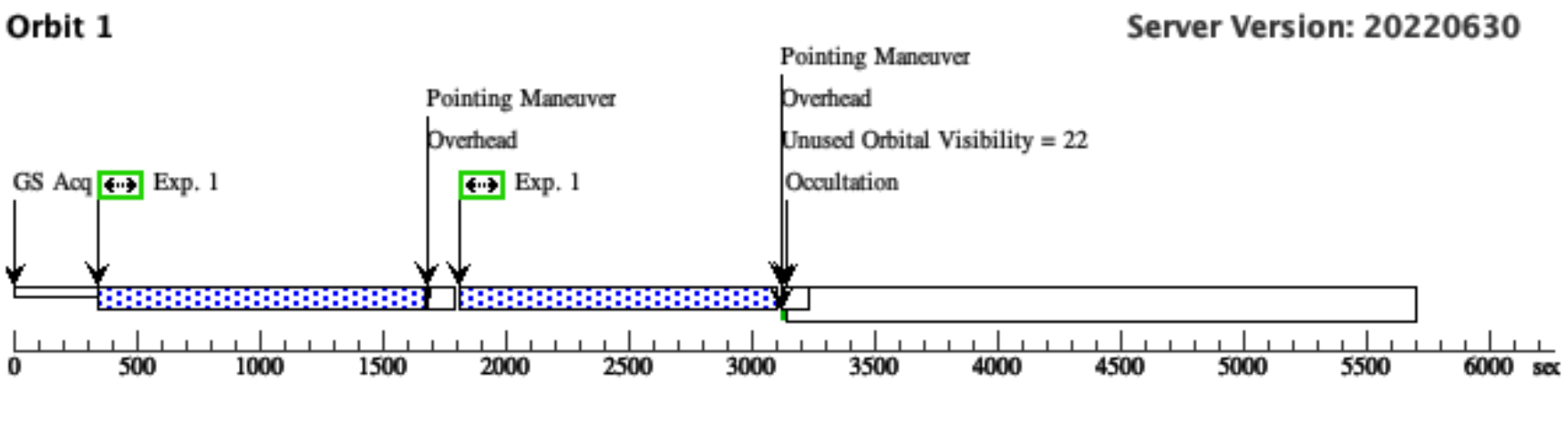
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	UGCA-116	RA: 05 55 42.6450 (88.9276875d) Dec: +03 23 32.23 (3.39229d) Equinox: J2000	Epoch of Position: 2015.5	V=11.46	Reference Frame: SIMBAD

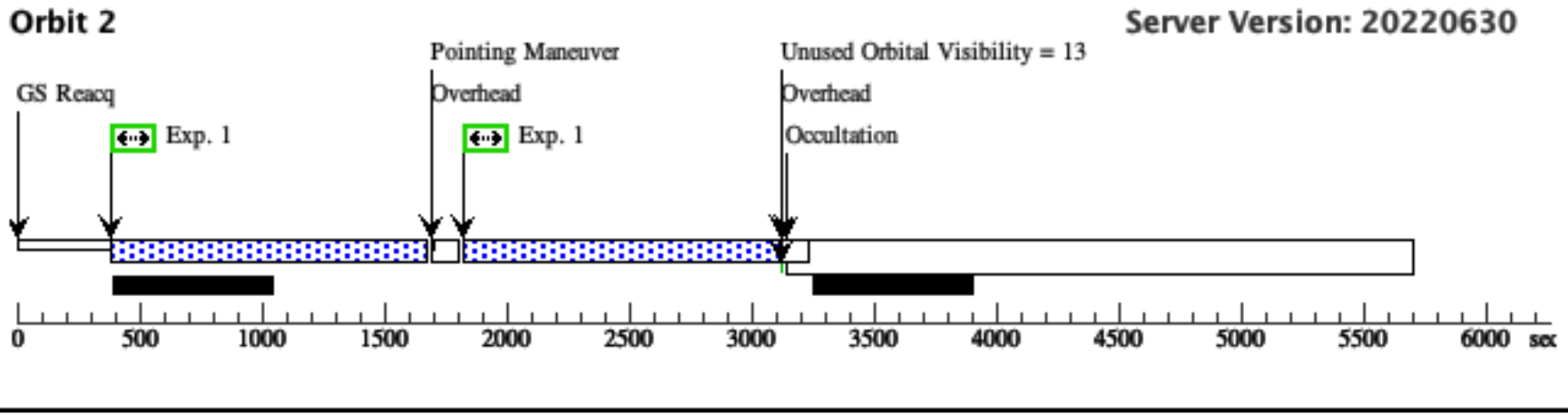
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=GALAXY
Description=[STARBURST]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) UGCA-116	WFC3/UVIS, ACCUM, UVIS2	F225W	CR-SPLIT=NO; FLASH=15		Pattern 2, Exps 1-1 in Visit 02 (2)	1296 Secs (5184 Secs)	
								[==>(Pattern 1)] *[==>(Pattern 2)]*	***[1]***
								[==>(Pattern 3)] *[==>(Pattern 4)]*	***[2]***

Orbit Structure





Visit

Proposal 17096, Visit 03, implementation Mon Oct 03 11:00:40 GMT 2022

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false		(1)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	UGCA-116	RA: 05 55 42.6450 (88.9276875d) Dec: +03 23 32.23 (3.39229d) Equinox: J2000	Epoch of Position: 2015.5	V=11.46	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=GALAXY
Description=[STARBURST]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) UGCA-116	WFC3/UVIS, ACCUM, UVIS2	F438W	FLASH=15; CR-SPLIT=NO		Pattern 2, Exps 1-1 in Visit 03 (2)	500 Secs (2000 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***

Orbit Structure