



16766 - What powers the longest-rising superluminous supernova 2020abjc?

Cycle: 29, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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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	(3) ZTF20ACPYLDH	WFC3/IR	2	26-Jul-2021 14:00:48.0	yes
02	(3) ZTF20ACPYLDH	WFC3/IR	2	26-Jul-2021 14:00:50.0	yes

4 Total Orbits Used

ABSTRACT

Super-luminous supernovae (SLSNe) are rare stellar explosions whose explosion mechanism and source of immense luminosity are not well established. SN2020abjc is the longest-lasting SLSN known. Its properties are extreme, even for slow-evolving SLSNe. Its spectrum shows no sign of interaction of the SN ejecta with a circumstellar medium and its light curve (shape and colour) rejects a central engine such as a magnetar. We are thus left with the conclusion that a long-lasting light curve equals a long diffusion time, which again requires a very high total mass. The pair-instability-supernova (PISN) mechanism naturally provides both the energy source (a lot of Ni) and the long diffusion time (large mass). Could SN2020abjc be a PISN? We propose to obtain slitless near-IR spectroscopy with WFC3/IR and the G102 and G141 gratings to measure the amount of iron, sulphur, silicon and helium in the ashes of the SN progenitor. This will enable us to unveil the explosion mechanism and the progenitor of this unusual SLSN.

OBSERVING DESCRIPTION

Our goal is to obtain grism spectroscopy of a superluminous supernova with WFC3/IR using both the G102 and G141 gratings.

Our proposal consists of:

-2 visits of WFC3/IR spectroscopy comprising of one orbit in G102 and G141 each. The zeroth-order image are obtained with F105W and F140W.

-Each orbit is divided as follows [image, grism] ..dither.. [image, grism] ..dither.. [grism, image] ..dither.. [grism, image].

-Each observations is labelled as GRISM-[102|141]-OR[1|2|3|4]-V[1|2][a|b|c|d]-[PREIM|SPEC]:

[102|141] specifies the grism ID

OR[1|2|3|4] specifies the orbit number

V[1|2][a|b|c|d] specifies the whether this is the first or second visit and the position in the 4-point dither sequence

[PREIM|SPEC] specifies whether this the zeroth-order or spectroscopic observation

-We wish the second orientation to be offset from the first, but still within these original constraints. This is to avoid contamination of the spectrum by fainter sources we have not detected yet. We have set this offset from orbit 1 to 30 to 150 degree.

-We have no further scheduling constraints on the two visits, i.e., visit 1 and 2 can be weeks or even months apart.

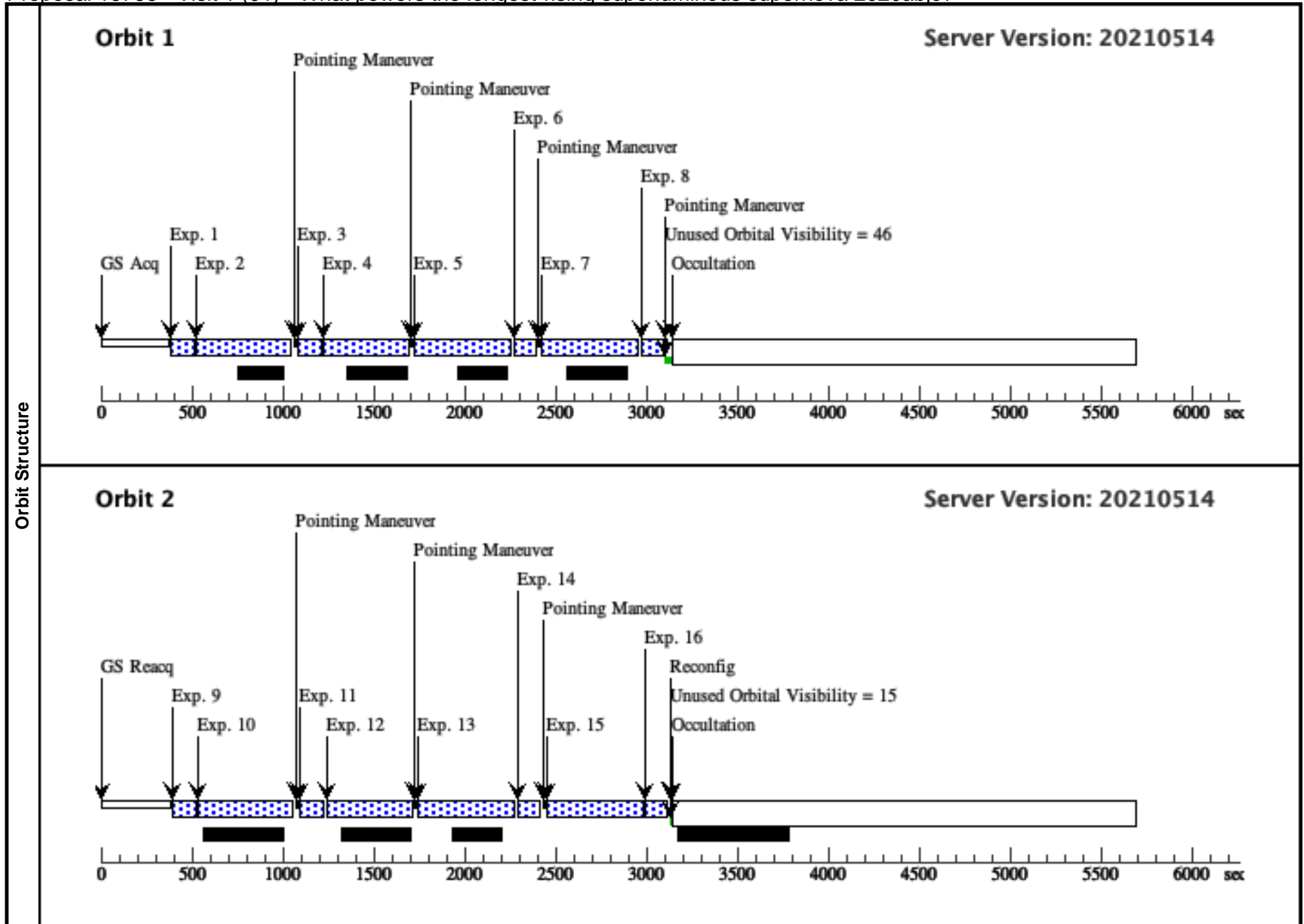
Proposal 16766 - Visit 1 (01) - What powers the longest-rising superluminous supernova 2020abc?

Mon Jul 26 18:00:51 GMT 2021

Visit	<p>Proposal 16766, Visit 1 (01)</p> <p>Diagnostic Status: Warning</p> <p>Scientific Instruments: WFC3/IR</p> <p>Special Requirements: (none)</p> <p><i>Comments: Grism and pre-imaging visit 1</i> <i>4 x (100s preimaging + 500s grism) in G102 and G141 each</i> <i>order: preim, grism, preim, grism, grism, preim, grism, preim (to minimise HeI at end of orbit)</i> <i>4 position dither pattern plus -1", -1" offset</i></p>					
Diagnostics	<p>(Visit 1 (01)) Warning (Orbit Planner): SAME POS MAY NOT BE APPROPRIATE</p> <p>(Visit 1 (01)) Warning (Orbit Planner): SAME POS MAY NOT BE APPROPRIATE</p> <p>(Visit 1 (01)) Warning (Orbit Planner): SAME POS MAY NOT BE APPROPRIATE</p> <p>(Visit 1 (01)) Warning (Orbit Planner): SAME POS MAY NOT BE APPROPRIATE</p> <p>(Visit 1 (01)) Warning (Orbit Planner): SAME POS MAY NOT BE APPROPRIATE</p> <p>(Visit 1 (01)) Warning (Orbit Planner): SAME POS MAY NOT BE APPROPRIATE</p> <p>(Visit 1 (01)) Warning (Orbit Planner): SAME POS MAY NOT BE APPROPRIATE</p> <p>(Visit 1 (01)) Warning (Orbit Planner): SAME POS MAY NOT BE APPROPRIATE</p>					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(3)	ZTF20ACPYLDH	RA: 09 28 0.2800 (142.0011667d)		V=23+/-1	Reference Frame: ICRS
		Alt Name1: SN2020ABJC	Dec: +14 07 16.61 (14.12128d) Equinox: J2000			
	<p><i>Comments:</i> <i>Category=EXT-STAR</i> <i>Description=[SUPERNOVA]</i> <i>Extended=NO</i></p>					

Proposal 16766 - Visit 1 (01) - What powers the longest-rising superluminous supernova 2020abc?

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
Exposures	1	GRISM-102 -OR1-V1a-P REIM	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	F105W	NSAMP=5; SAMP-SEQ=SPAR S25	POS TARG -1.0,-1.0	102.934351 Secs (102.934 Secs)	[==>]	[1]
	2	GRISM-102 -OR1-V1a-S PEC	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	G102	NSAMP=11; SAMP-SEQ=SPAR S50	SAME POS AS 1	502.936801 Secs (502.937 Secs)	[==>]	[1]
	3	GRISM-102 -OR1-V1b-P REIM	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	F105W	NSAMP=5; SAMP-SEQ=SPAR S25	POS TARG 0.355,- .576	102.934351 Secs (102.934 Secs)	[==>]	[1]
	4	GRISM-102 -OR1-V1b-S PEC	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	G102	NSAMP=10; SAMP-SEQ=SPAR S50	SAME POS AS 3	452.93635 Secs (452.936 Secs)	[==>]	[1]
	5	GRISM-102 -OR1-V1c-S PEC	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	G102	NSAMP=11; SAMP-SEQ=SPAR S50	POS TARG -0.119,0 .212	502.936801 Secs (502.937 Secs)	[==>]	[1]
	6	GRISM-102 -OR1-V1c-P REIM	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	F105W	NSAMP=5; SAMP-SEQ=SPAR S25	SAME POS AS 5	102.934351 Secs (102.934 Secs)	[==>]	[1]
	7	GRISM-102 -OR1-V1d-S PEC	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	G102	NSAMP=11; SAMP-SEQ=SPAR S50	POS TARG -1.474,- 0.218	502.936801 Secs (502.937 Secs)	[==>]	[1]
	8	GRISM-102 -OR1-V1d-P REIM	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	F105W	NSAMP=5; SAMP-SEQ=SPAR S25	SAME POS AS 7	102.934351 Secs (102.934 Secs)	[==>]	[1]
	9	GRISM-141 -OR1-V1a-P REIM	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	F140W	NSAMP=5; SAMP-SEQ=SPAR S25	POS TARG -1,-1	102.934351 Secs (102.934 Secs)	[==>]	[2]
	10	GRISM-141 -OR2-V1a-S PEC	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	G141	NSAMP=11; SAMP-SEQ=SPAR S50	SAME POS AS 9	502.936801 Secs (502.937 Secs)	[==>]	[2]
	11	GRISM-141 -OR2-V1b-P REIM	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	F140W	NSAMP=5; SAMP-SEQ=SPAR S25	POS TARG 0.355,- .576	102.934351 Secs (102.934 Secs)	[==>]	[2]
	12	GRISM-141 -OR2-V1b-S PEC	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	G141	NSAMP=10; SAMP-SEQ=SPAR S50	SAME POS AS 11	452.93635 Secs (452.936 Secs)	[==>]	[2]
	13	GRISM-141 -OR2-V1c-S PEC	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	G141	NSAMP=11; SAMP-SEQ=SPAR S50	POS TARG -0.119,0 .212	502.936801 Secs (502.937 Secs)	[==>]	[2]
	14	GRISM-141 -OR2-V1c-P REIM	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	F140W	NSAMP=5; SAMP-SEQ=SPAR S25	SAME POS AS 13	102.934351 Secs (102.934 Secs)	[==>]	[2]
	15	GRISM-141 -OR2-V1d-S PEC	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	G141	NSAMP=11; SAMP-SEQ=SPAR S50	POS TARG -1.474,- 0.218	502.936801 Secs (502.937 Secs)	[==>]	[2]
	16	GRISM-141 -OR2-V1d-P REIM	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	F140W	NSAMP=5; SAMP-SEQ=SPAR S25	SAME POS AS 15	102.934351 Secs (102.934 Secs)	[==>]	[2]



Proposal 16766 - Visit 2 (02) - What powers the longest-rising superluminous supernova 2020abc?

Mon Jul 26 18:00:51 GMT 2021

Visit	<p>Proposal 16766, Visit 2 (02)</p> <p>Diagnostic Status: Warning</p> <p>Scientific Instruments: WFC3/IR</p> <p>Special Requirements: ORIENT 30D TO 150D FROM 01</p> <p><i>Comments: Grism and pre-imaging visit 2</i> <i>4 x (100s preimaging + 500s grism) in G102 and G141 each</i> <i>order: preim, grism, preim, grism, grism, preim, grism, preim (to minimise HeI at end of orbit)</i> <i>4 position dither pattern plus -1", -1" offset</i></p>					
	Diagnostics	(Visit 2 (02)) Warning (Orbit Planner): SAME POS MAY NOT BE APPROPRIATE				
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Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(3)	ZTF20ACPYLDH Alt Name1: SN2020ABJC	RA: 09 28 0.2800 (142.0011667d) Dec: +14 07 16.61 (14.12128d) Equinox: J2000		V=23+/-1	Reference Frame: ICRS
<p><i>Comments:</i> <i>Category=EXT-STAR</i> <i>Description=[SUPERNOVA]</i> <i>Extended=NO</i></p>						

Proposal 16766 - Visit 2 (02) - What powers the longest-rising superluminous supernova 2020abc?

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit	
Exposures	1	GRISM-102 -OR3-V2a-P REIM	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	F105W	NSAMP=5; SAMP-SEQ=SPAR S25	POS TARG -1.0,-1.0	102.934351 Secs (102.934 Secs) [==>]	[1]	
	<i>Comments: Updated preimaging after results of VI</i>									
	2	GRISM-102 -OR3-V2a-S PEC	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	G102	NSAMP=11; SAMP-SEQ=SPAR S50	SAME POS AS 1	502.936801 Secs (502.937 Secs) [==>]	[1]	
	3	GRISM-102 -OR3-V2b-P REIM	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	F105W	NSAMP=5; SAMP-SEQ=SPAR S25	POS TARG 0.355,-0 .576	102.934351 Secs (102.934 Secs) [==>]	[1]	
	4	GRISM-102 -OR3-V2b-S PEC	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	G102	NSAMP=10; SAMP-SEQ=SPAR S50	SAME POS AS 3	452.93635 Secs (452.936 Secs) [==>]	[1]	
	5	GRISM-102 -OR3-V2c-S PEC	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	G102	NSAMP=11; SAMP-SEQ=SPAR S50	POS TARG -0.119,0 .212	502.936801 Secs (502.937 Secs) [==>]	[1]	
	6	GRISM-102 -OR3-V2c-P REIM	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	F105W	NSAMP=5; SAMP-SEQ=SPAR S25	SAME POS AS 5	102.934351 Secs (102.934 Secs) [==>]	[1]	
	7	GRISM-102 -OR3-V2d-S PEC	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	G102	NSAMP=11; SAMP-SEQ=SPAR S50	POS TARG -1.474,- 0.218	502.936801 Secs (502.937 Secs) [==>]	[1]	
	8	GRISM-102 -OR3-V2d-P REIM	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	F105W	NSAMP=5; SAMP-SEQ=SPAR S25	SAME POS AS 7	102.934351 Secs (102.934 Secs) [==>]	[1]	
	9	GRISM-141 -OR4-V2a-P REIM	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	F140W	NSAMP=5; SAMP-SEQ=SPAR S25	POS TARG -1,-1	102.934351 Secs (102.934 Secs) [==>]	[2]	
	10	GRISM-141 -OR4-V2a-S PEC	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	G141	NSAMP=11; SAMP-SEQ=SPAR S50	SAME POS AS 9	502.936801 Secs (502.937 Secs) [==>]	[2]	
	11	GRISM-141 -OR4-V2b-P REIM	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	F140W	NSAMP=5; SAMP-SEQ=SPAR S25	POS TARG 0.355,-0 .576	102.934351 Secs (102.934 Secs) [==>]	[2]	
	12	GRISM-141 -OR4-V2b-S PEC	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	G141	NSAMP=10; SAMP-SEQ=SPAR S50	SAME POS AS 11	452.93635 Secs (452.936 Secs) [==>]	[2]	
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	14	GRISM-141 -OR4-V2c-P REIM	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	F140W	NSAMP=5; SAMP-SEQ=SPAR S25	SAME POS AS 13	102.934351 Secs (102.934 Secs) [==>]	[2]	
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16	GRISM-141 -OR4-V2d-P REIM	(3) ZTF20ACPYLD H	WFC3/IR, MULTIACCUM, GRISM1024	F140W	NSAMP=5; SAMP-SEQ=SPAR S25	SAME POS AS 15	102.934351 Secs (102.934 Secs) [==>]	[2]		

