



16662 - Lyman-alpha Observations of a z=8.45 Powerful Radio Galaxy

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	(1) GLEAMJ091734-001243	WFC3/IR	1	05-Oct-2021 11:00:56.0	yes
02	(1) GLEAMJ091734-001243	WFC3/IR	1	05-Oct-2021 11:00:57.0	yes
03	(1) GLEAMJ091734-001243	WFC3/IR	1	05-Oct-2021 11:00:58.0	yes
04	(1) GLEAMJ091734-001243	WFC3/IR	1	05-Oct-2021 11:00:59.0	yes

4 Total Orbits Used

ABSTRACT

Powerful radio galaxies have been unique probes of the distant Universe for many decades. This proposal requests WFC3 G141 grism with F140W pre-imaging observations to confirm an emission line observed at 1.15 microns. A high continuum flux longward of this line (seen with the G141 grism and broad-band photometry) would confirm that this line is Lyman-alpha and hence this radio galaxy at $z=8.45$. This detection would be the most distant super-massive black hole (SMBH) and active galactic nucleus (AGN) known. At this redshift the radio galaxy would lie at the centre of a highly ionised Stromgren sphere with contributions to the ionising flux from the accretion onto the SMBH, inverse Compton emission from the jets, and star-formation. As well as reaffirming the redshift of the host and challenging models of black hole formation, these observations will potentially reveal the complex interaction of this radio-loud AGN with its local environment. Furthermore, confirmation of the existence of a luminous radio galaxy within the Epoch of Reionisation would allow studies of neutral hydrogen from absorption of the 21 cm line. Due to the transmission of the Earth's atmosphere at 1.15 microns, this observation would take >40 times longer if conducted from the ground (eight times longer if the spectrum is binned to the resolution of the G141 grism).

OBSERVING DESCRIPTION

The aim of this proposal is to confirm the redshift of a candidate ultra-high redshift radio galaxy. Previous G102 observations suggest a line at 1.15 μ m which may be Lyman-alpha. SED modelling supports this assertion. These G141 observations aim to (a) confirm this line and (b) confirm the interpretation that this line is Lyman-alpha (by detecting continuum and other lines longward of it).

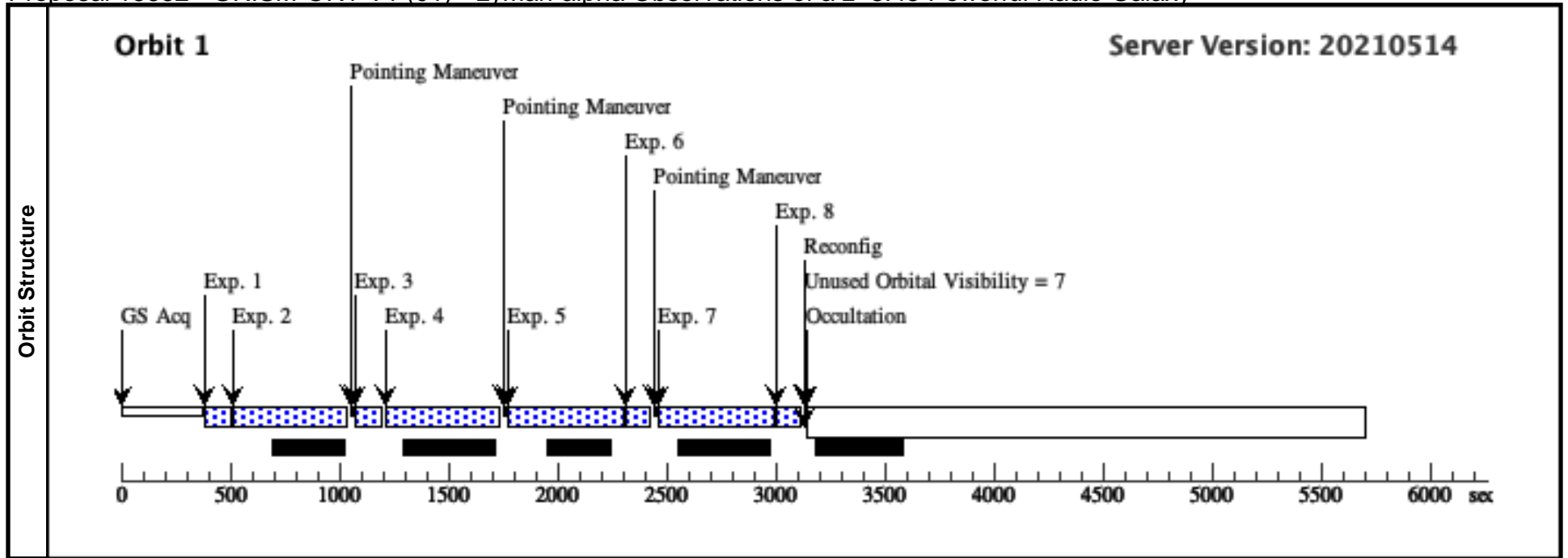
Our proposal consists of four orbits of G141 imaging with the F140W band as pre-imaging. As well as being ideal for the G141 grism, the F140W band supports the imaging we obtained previously with F098M and F105W. The four orbits are split into two orientations to provide redundancy and each orientation restricted to prevent contamination of the spectrum by an adjacent target.

These observations should not be impacted by a gyro failure (other than their schedulability). There are no time restraints.

Proposal 16662 - GRISM-OR1-V1 (01) - Lyman-alpha Observations of a z=8.45 Powerful Radio Galaxy

Tue Oct 05 15:01:00 GMT 2021

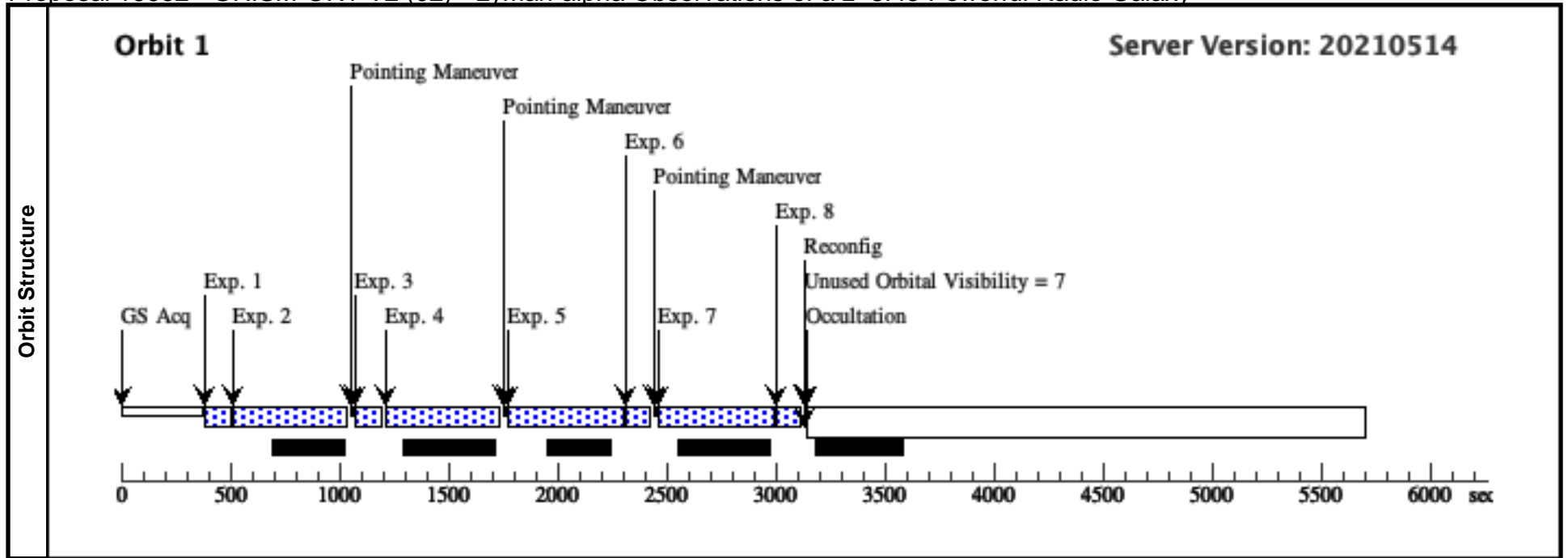
Visit	Proposal 16662, GRISM-OR1-V1 (01), implementation Diagnostic Status: Warning Scientific Instruments: WFC3/IR Special Requirements: ORIENT 181D TO 239 D; ORIENT 1D TO 59 D <i>Comments: Grism and pre-imaging orientation 1 visit 1 4x(78s preimaging + 503s grism) order: preim, grism, preim, grism, grism, preim, grism, preim (to minimise HeI at end of orbit) bespoke 4 position dither pattern with a minimum 10 pixel offset between each dither and a differing fraction of a pixel shift</i>									
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Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	GLEAMJ091734-001243	RA: 09 17 34.4200 (139.3934167d) Dec: -00 12 42.50 (-.21181d) Equinox: J2000		V=(?) F105W = 0.60+/-0.02 uJy	Reference Frame: ICRS				
<i>Comments: Redshift unknown, possible z~8 Category=GALAXY Description=[HIGH REDSHIFT GALAXY, RADIO GALAXY]</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	GRISM-OR 1-V1a-PREI M	(1) GLEAMJ091734 -001243	WFC3/IR, MULTIACCUM, GRISM1024	F140W	NSAMP=10; SAMP-SEQ=SPAR S10	POS TARG 0.65,0.6 ⁵		92.940958 Secs (92.941 Secs) [==>]	[1]
	2	GRISM-OR 1-V1a-SPE C	(1) GLEAMJ091734 -001243	WFC3/IR, MULTIACCUM, GRISM1024	G141	NSAMP=11; SAMP-SEQ=SPAR S50	SAME POS AS 1		502.936801 Secs (502.937 Secs) [==>]	[1]
	3	GRISM-OR 1-V1b-PREI M	(1) GLEAMJ091734 -001243	WFC3/IR, MULTIACCUM, GRISM1024	F140W	NSAMP=10; SAMP-SEQ=SPAR S10	POS TARG 0.975,-0.715		92.940958 Secs (92.941 Secs) [==>]	[1]
	4	GRISM-OR 1-V1b-SPE C	(1) GLEAMJ091734 -001243	WFC3/IR, MULTIACCUM, GRISM1024	G141	NSAMP=11; SAMP-SEQ=SPAR S50	SAME POS AS 3		502.936801 Secs (502.937 Secs) [==>]	[1]
	5	GRISM-OR 1-V1c-SPE C	(1) GLEAMJ091734 -001243	WFC3/IR, MULTIACCUM, GRISM1024	G141	NSAMP=11; SAMP-SEQ=SPAR S50	POS TARG -0.423,-0.813		502.936801 Secs (502.937 Secs) [==>]	[1]
	6	GRISM-OR 1-V1c-PREI M	(1) GLEAMJ091734 -001243	WFC3/IR, MULTIACCUM, GRISM1024	F140W	NSAMP=10; SAMP-SEQ=SPAR S10	SAME POS AS 5		92.940958 Secs (92.941 Secs) [==>]	[1]
	7	GRISM-OR 1-V1d-SPE C	(1) GLEAMJ091734 -001243	WFC3/IR, MULTIACCUM, GRISM1024	G141	NSAMP=11; SAMP-SEQ=SPAR S50	POS TARG -0.618,-0.553		502.936801 Secs (502.937 Secs) [==>]	[1]
	8	GRISM-OR 1-V1d-PREI M	(1) GLEAMJ091734 -001243	WFC3/IR, MULTIACCUM, GRISM1024	F140W	NSAMP=10; SAMP-SEQ=SPAR S10	SAME POS AS 7		92.940958 Secs (92.941 Secs) [==>]	[1]



Proposal 16662 - GRISM-OR1-V2 (02) - Lyman-alpha Observations of a z=8.45 Powerful Radio Galaxy

Tue Oct 05 15:01:00 GMT 2021

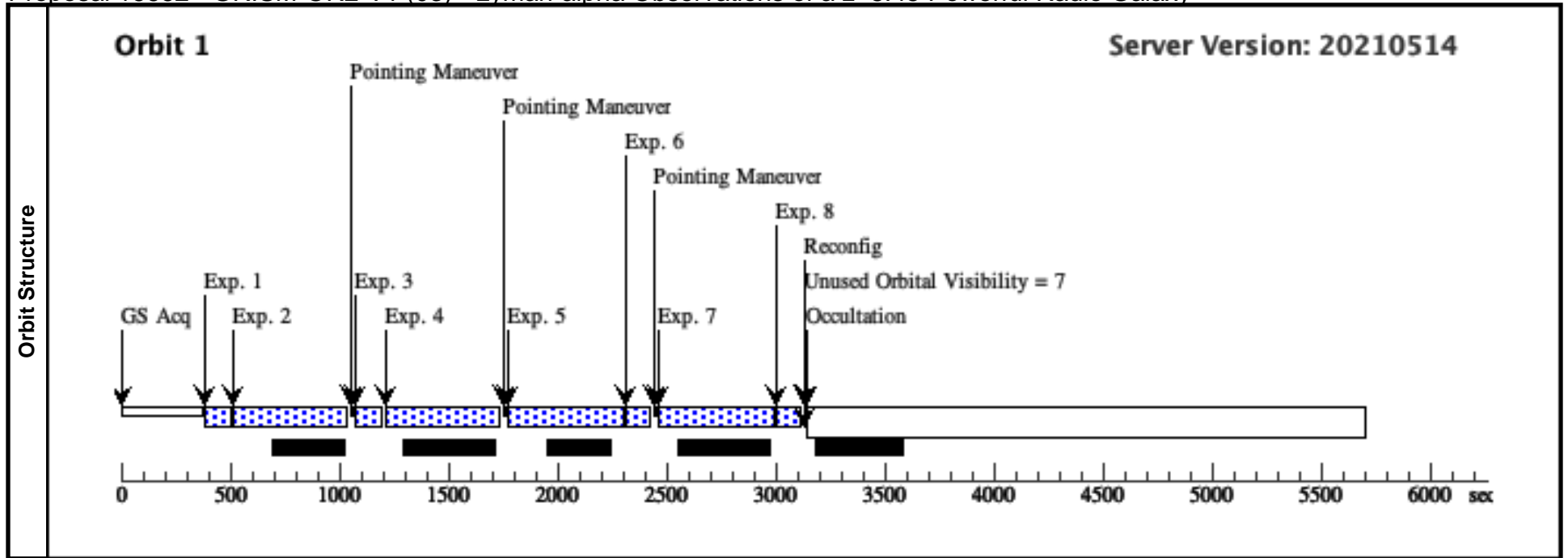
Visit	Proposal 16662, GRISM-OR1-V2 (02), implementation Diagnostic Status: Warning Scientific Instruments: WFC3/IR Special Requirements: SAME ORIENT AS 01 <i>Comments: Grism and pre-imaging orientation 1 visit 2 4x(78s preimaging + 503s grism) order: preim, grism, preim, grism, grism, preim, grism, preim (to minimise HeI at end of orbit) bespoke 4 position dither pattern with a minimum 10 pixel offset between each dither and a differing fraction of a pixel shift</i>																																																																																														
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Proposal 16662 - GRISM-OR2-V1 (03) - Lyman-alpha Observations of a z=8.45 Powerful Radio Galaxy

Tue Oct 05 15:01:00 GMT 2021

Visit	Proposal 16662, GRISM-OR2-V1 (03), implementation Diagnostic Status: Warning Scientific Instruments: WFC3/IR Special Requirements: ORIENT 5D TO 10D FROM 01 <i>Comments: Grism and pre-imaging orientation 2 visit 1 4x(77s preimaging + 503s grism) order: preim, grism, preim, grism, grism, preim, grism, preim (to minimise HeI at end of orbit) bespoke 4 position dither pattern with a minimum 10 pixel offset between each dither and a differing fraction of a pixel shift</i>									
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Tue Oct 05 15:01:00 GMT 2021

Visit	Proposal 16662, GRISM-OR2-V2 (04), implementation Diagnostic Status: Warning Scientific Instruments: WFC3/IR Special Requirements: SAME ORIENT AS 03 <i>Comments: Grism and pre-imaging orientation 1 visit 1 4x(77s preimaging + 503s grism) order: preim, grism, preim, grism, grism, preim, grism, preim (to minimise HeI at end of orbit) bespoke 4 position dither pattern with a minimum 10 pixel offset between each dither and a differing fraction of a pixel shift</i>									
	Diagnosics (GRISM-OR2-V2 (04)) Warning (Orbit Planner): SAME POS MAY NOT BE APPROPRIATE (GRISM-OR2-V2 (04)) Warning (Orbit Planner): SAME POS MAY NOT BE APPROPRIATE (GRISM-OR2-V2 (04)) Warning (Orbit Planner): SAME POS MAY NOT BE APPROPRIATE (GRISM-OR2-V2 (04)) Warning (Orbit Planner): SAME POS MAY NOT BE APPROPRIATE									
Fixed Targets	# Name Target Coordinates Targ. Coord. Corrections Fluxes Miscellaneous									
	(1) GLEAMJ091734-001243 RA: 09 17 34.4200 (139.3934167d) Dec: -00 12 42.50 (-.21181d) Equinox: J2000 <i>Comments: Redshift unknown, possible z~8 Category=GALAXY Description=[HIGH REDSHIFT GALAXY, RADIO GALAXY]</i>	V=(?) F105W = 0.60+/-0.02 uJy Reference Frame: ICRS								
Exposures	# Label Target Config,Mode,Aperture Spectral Els. Opt. Params. Special Reqs. Groups Exp. Time (Total)/[Actual Dur.] Orbit									
	1	GRISM-OR 1-V2a-PREI M	(1) GLEAMJ091734 -001243	WFC3/IR, MULTIACCUM, GRISM1024	F140W	NSAMP=10; SAMP-SEQ=SPAR S10	POS TARG 0.65,0.6 5		92.940958 Secs (92.941 Secs) [==>]	[1]
	2	GRISM-OR 1-V2a-SPE C	(1) GLEAMJ091734 -001243	WFC3/IR, MULTIACCUM, GRISM1024	G141	NSAMP=11; SAMP-SEQ=SPAR S50	SAME POS AS 1		502.936801 Secs (502.937 Secs) [==>]	[1]
	3	GRISM-OR 1-V2b-PREI M	(1) GLEAMJ091734 -001243	WFC3/IR, MULTIACCUM, GRISM1024	F140W	NSAMP=10; SAMP-SEQ=SPAR S10	POS TARG 0.975,-0 .715		92.940958 Secs (92.941 Secs) [==>]	[1]
	4	GRISM-OR 1-V2b-SPE C	(1) GLEAMJ091734 -001243	WFC3/IR, MULTIACCUM, GRISM1024	G141	NSAMP=11; SAMP-SEQ=SPAR S50	SAME POS AS 3		502.936801 Secs (502.937 Secs) [==>]	[1]
	5	GRISM-OR 1-V2c-SPE C	(1) GLEAMJ091734 -001243	WFC3/IR, MULTIACCUM, GRISM1024	G141	NSAMP=11; SAMP-SEQ=SPAR S50	POS TARG -0.423,- 0.813		502.936801 Secs (502.937 Secs) [==>]	[1]
	6	GRISM-OR 1-V2c-PREI M	(1) GLEAMJ091734 -001243	WFC3/IR, MULTIACCUM, GRISM1024	F140W	NSAMP=10; SAMP-SEQ=SPAR S10	SAME POS AS 5		92.940958 Secs (92.941 Secs) [==>]	[1]
	7	GRISM-OR 1-V2d-SPE C	(1) GLEAMJ091734 -001243	WFC3/IR, MULTIACCUM, GRISM1024	G141	NSAMP=11; SAMP-SEQ=SPAR S50	POS TARG -0.618,- 0.553		502.936801 Secs (502.937 Secs) [==>]	[1]
	8	GRISM-OR 1-V2d-PREI M	(1) GLEAMJ091734 -001243	WFC3/IR, MULTIACCUM, GRISM1024	F140W	NSAMP=10; SAMP-SEQ=SPAR S10	SAME POS AS 7		92.940958 Secs (92.941 Secs) [==>]	[1]

