



4056 - Shedding Light on Early Structure Formation: Disecting the Largest Gas Reservoirs of $z=6.6$ QSOs

Cycle: 2, Proposal Category: GO

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OBSERVATIONS

<i>Folder</i>	<i>Observation</i>	<i>Label</i>	<i>Observing Template</i>	<i>Science Target</i>
P323+21				
	1	P323+21	NIRSpec IFU Spectroscopy	(3) Group P323+21
P231-20				
	2	P231-20	NIRSpec IFU Spectroscopy	(6) Group P231-20

ABSTRACT

QSOs at the end of cosmic reionization are among the most luminous sources in the Universe. Their luminosity is produced by extreme gas accretion onto their central black holes, which grow by 20x in only 100Myr. Simultaneously, QSO host galaxies form hundreds of stars per year, using up gas in the process. Extensive VLT/MUSE observational campaigns recently revealed that $z=6.6$ QSOs P323+12 and P231-20 are embed in exceptionally large ($>20pKpc$) and luminous ($L>10^{44}$ erg/s) Ly-Alpha nebulae. These are tracer of the enormous cool gas reservoirs that are required to continuously fuel the rapid build up of the earliest QSOs.

However, the physical perperties of the gas in the nebulae cannot be constrained due to the resonant nature of the Ly-Alpha emission. NIRSpec IFU observations of non-resonant emission lines such as H-Alpha and [OIII] will characterize unambiguously the total mass and the kinematics of the emitting gas. NIRSpec in IFU mode is absolutely critical for our experiment: it is the only instrument that can provide the high spatial and spectral resolution and the high sensitivity necessary to map with unparalleled accuracy the 3D distribution of the cool gas in these two spectacular systems.

This will enable an comprehensive characterization of the circum-galactic medium of two of the brightest and most active QSOs at $z > 6$.

This data has the exciting prospect of unveiling the complex link between hierarchical structure formation, the stellar mass growth in galaxies, and the QSO activity at the dawn of the Universe, when current models of massive galaxy formation can be better constrained.

OBSERVING DESCRIPTION

NIRSpec IFU observations of the two brightest Ly-Alpha nebulae known around $z > 6$ QSOs.

Note that a position angle of 45 degrees is favoured. However, we will adapt our PA depending on when the observations will be scheduled.

Observation 1 - NIRSpec IFU observations of P323+21

NIRSpec IFU observation with G395H/F290LP.

The target is observed with 6 exposures in a cycling dither pattern.

NRSIRS2 has been selected for a better identification and removal of cosmic ray glitches.

Observation 2 - NIRSpec IFU observations of P231-20

NIRSpec IFU observation with G395H/F290LP.

The target is observed with 6 exposures in a cycling dither pattern.

NRSIRS2 has been selected for a better identification and removal of cosmic ray glitches.

Proposal 4056 - Targets - Shedding Light on Early Structure Formation: Disecting the Largest Gas Reservoirs of z=6.6 QSOs

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	P323+21-QSO	RA: 21 32 33.2130 (323.1383875d) Dec: +12 17 54.87 (12.29857d) Equinox: J2000		
<p><i>Comments: Background+QSO observations</i> <i>Category=Galaxy</i> <i>Description=[Galaxy halos, High-redshift galaxies, Quasars]</i> <i>Extended=YES</i></p>				
(2)	P323+21-HALO	RA: 21 32 33.1965 (323.1383187d) Dec: +12 17 56.71 (12.29909d) Equinox: J2000		
<p><i>Comments: Halo+QSO observations</i> <i>Category=Galaxy</i> <i>Description=[Galaxy halos, High-redshift galaxies, Quasars]</i> <i>Extended=YES</i></p>				
(3)	Group P323+21			
<p><i>Comments:</i> <i>Target Selection=[1 P323+21-QSO, 2 P323+21-HALO]</i></p>				
(4)	P231-20-QSO	RA: 15 26 37.8828 (231.6578450d) Dec: -20 50 1.10 (-20.83364d) Equinox: J2000		
<p><i>Comments: Background+QSO observations</i> <i>Category=Galaxy</i> <i>Description=[Galaxy halos, High-redshift galaxies, Quasar-galaxy pairs, Quasars]</i> <i>Extended=YES</i></p>				
(5)	P231-20-HALO	RA: 15 26 37.8366 (231.6576525d) Dec: -20 49 59.48 (-20.83319d) Equinox: J2000		
<p><i>Comments: Halo+QSO observations</i> <i>Category=Galaxy</i> <i>Description=[Galaxy halos, High-redshift galaxies, Quasar-galaxy pairs, Quasars]</i> <i>Extended=YES</i></p>				
(6)	Group P231-20			
<p><i>Comments:</i> <i>Target Selection=[4 P231-20-QSO, 5 P231-20-HALO]</i></p>				

Fixed Targets

Proposal 4056 - Observation 1 - Shedding Light on Early Structure Formation: Disecting the Largest Gas Reservoirs of z=6.6 QSOs

Mon Jun 12 18:01:24 GMT 2023

Observation	Proposal 4056, Observation 1: P323+21 Diagnostic Status: Warning Observing Template: NIRSspec IFU Spectroscopy Background Observations:[]											
	(Visit 1:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.											
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	(3)	Group P323+21										
<i>Comments:</i> Target Selection=[1 P323+21-QSO, 2 P323+21-HALO]												
Template	TA Method											
	NONE											
Dithers	#	Dither Type		Size	Starting Point			Number of Points	Points			
	1	CYCLING		MEDIUM	1			6				
Spectral Elements	#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
	1	G395H/F290LP	NRSIRS2	20	1	false	true	NONE	6	6	8840.867	

Proposal 4056 - Observation 2 - Shedding Light on Early Structure Formation: Disecting the Largest Gas Reservoirs of z=6.6 QSOs

Mon Jun 12 18:01:24 GMT 2023

Observation	Proposal 4056, Observation 2: P231-20 Diagnostic Status: Warning Observing Template: NIRSspec IFU Spectroscopy Background Observations:[]																																			
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