



# Observing Application

Date : Dec, 05 2011  
 Proposal ID : VLA/11B-238  
 Legacy ID : AR790  
 PI : Dominik Riechers  
 Type : Director's Discretionary  
 Time - Exploratory Time  
 Category : High Redshift and Source  
 Surveys  
 Total Time : 5.0

## Total Molecular Gas Mass of the Most Distant Starburst Galaxy

### Abstract:

Based on a "blind" CO/[CII] search following up extremely red Herschel/SPIRE sources in the HerMES survey, we have recently discovered a very bright starburst galaxy at an unprecedented redshift of  $z=6.3369$ . Our initial follow-up reveals a suite of bright molecular and atomic emission lines, demonstrating that we have identified the best possible target at  $z>6$  for a detailed, in-depth study of the ISM properties of the first generation of starburst galaxies. We here aim to measure the total molecular gas mass and to constrain size of the gas reservoir based on an EVLA CO J=2-1 measurement. This will crucially constrain the physical properties (temperature/density) of the gas based on a more detailed sampling of the CO excitation ladder. This will be a central part of our comprehensive study, which sets out to reveal the physical processes (collisional vs. radiative excitation) that give rise to the rich molecular chemistry in this source, and the mechanism (mergers vs. cold accretion) that drives its intense starburst. This detailed investigation will be a key demonstration of the power of very early universe studies with the full EVLA and ALMA in the years to come.

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### Related proposals:

**Joint:**

Not a Joint Proposal

**Observing type(s):**

Spectroscopy, Single Pointing(s)

**VLA Resources**

Name	Conf.	Frontend & Backend	Setup
fls3res	D	Ka Band 0.9 cm 26500 - 40000 MHz WIDAR OSRO1: 2 Subbands/Full polz	Rest frequencies: 31421.7, 32500.0 MHz Subband Bandwidth: 128.0 MHz No. of Channels: 64 Poln. products: 4.0 Channel Width: 2000.0 kHz

**Sources:**

Name	Position		Velocity		Group
FLS3	Coordinate System	Equatorial	Convention	Redshift	HerMES-Red
	Equinox	J2000			
	Right Ascension	17:06:47.784	Ref. Frame	LSRK	
		00:00:00.0			
Declination	+58:46:23.52	Redshift	6.3369		
	00:00:00.0				

**Sessions:**

Name	Session Time (hours)	Repeat	Separation	LST minimum	LST maximum	Elevation Minimum
FLS3ses	2.50	2	0 day	11:00:00	23:00:00	30

**Session Constraints:**

Name	Constraints	Comments
FLS3ses		target rms of 65uJy/bm per 10.5MHz is averaged over both sessions.

**Session Source/Resource Pairs:**

Session Name	Source	Resource	Time	Figure of Merit	Subarray
FLS3ses	FLS3	fls3res	2.5 hour	0.065 mJy/bm	

Present for observation: no

Staff support: None

Plan of Dissertation: no