



Observing Application

Date : Jun, 01 2009
Proposal ID : VLA/09A-201
Legacy ID : A1136
PI : Rob Ivison
Type : Rapid Response - Exploratory Time
Category : Extragalactic
Total Time : 12.0

The radio properties of the brightest high-z sub-mm galaxy

Abstract:

We request exploratory time to map CO(1-0) and the radio continuum in the brightest known submm galaxy ($S_{870\mu m} = 106\text{mJy}$), discovered in May 2009. Due to lensing amplification (factor 32x) this galaxy is representative of SMGs near the current confusion limit, yet bright enough to allow sub-kpc imaging in the source plane, thus allowing direct comparison with local ULIRGs. Due to its extreme brightness, we have been able to determine a redshift of 2.3259 using GBT/Zpectrometer - the first truly blind CO detection - as well as obtaining $S/N > 100$ detections at IRAM in CO(3-2) and CO(4-3) and a $> 20\sigma$ detection at SMA in 870-um continuum. Due to the lensing, a 0.7" beam will provide $\sim 500\text{pc}$ resolution in the source plane, enabling us to measure the distribution and size of the gas reservoir, probe the gas dynamics, measure the star-formation efficiency and star-forming potential, construct the CO ladder and probe the FIR/radio correlation within individual star-forming regions. We have applied via the normal route for D-configuration time; exploratory time offers our only chance to probe $< 2''$ scales prior to late 2010, possibly 2011.

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Related proposals:

Joint:

Not a Joint Proposal

Observing type(s):

Continuum, Spectroscopy

VLA Resources

Name	Conf.	Frontend & Backend	Setup
SMG-CnB-X	CnB	X Band 3.6 cm 8080 - 8750 MHz VLA Correlator - Single Channel Continuum	Rest frequencies: 8435.1 MHz Bandwidth: 50 MHz
SMG-CnB	CnB	Ka Band 0.9 cm 26500 - 40000 MHz VLA Correlator - Spectral Line	Rest frequencies: 34668.75,34631.25 MHz Bandwidth: 50 MHz Spectral resolution: 6250.0 kHz IF Mode: 2 No. of Channels: 8
SMG-CnB-Ka	CnB	Ka Band 0.9 cm 26500 - 40000 MHz VLA Correlator - Single Channel Continuum	Rest frequencies: 34650,34550 MHz Bandwidth: 50 MHz

Sources:

Name	RA / RA Range	Dec / Dec Range	Epoch	Velocity / z	Group
SMG	21:35:11.6 00:00:00.0	-1:02:51 00:00:00	J2000	Redshift : 2.32688	MACSJ2135-0102

Sessions:

Name	Session Time (hours)	Repeat	Separation	LST minimum	LST maximum	Elevation Minimum
SMG-X-continuum	2.00	1	0 day	20:30:00	22:30:00	0
SMG-CO-test	2.00	1	0 day	20:30:00	22:30:00	0
SMG-CO-line	4.00	2	0 day	19:30:00	23:30:00	0

Session Constraints:

Name	Constraints	Comments
SMG-X-continuum		
SMG-CO-test		We expect to reach 130uJy/beam r.m.s. in each IF pair, in 1.5hr of on-source integration time.
SMG-CO-line		We expect to reach 340uJy/beam r.m.s. per channel in 3hr of on-source integration (i.e. 25% overheads, to include pointing)

Session Source/Resource Pairs:

Session Name	Source	Resource	Time	Figure of Merit	Subarray
SMG-X-continuum	SMG	SMG-CnB-X	2.0 hour	0.015 mJy/bm	
SMG-CO-test	SMG	SMG-CnB-Ka	2.0 hour	0.13 mJy/bm	
SMG-CO-line	SMG	SMG-CnB	4.0 hour	0.34 mJy/bm	

Present for observation: no

Staff support: Consultation

Plan of Dissertation: no

