



# Observing Application

Date : Jan, 13 2012  
 Proposal ID : VLA/11B-244  
 Legacy ID : AR791  
 PI : Dominik Riechers  
 Type : Director's Discretionary  
 Time - Exploratory Time  
 Category : High Redshift and Source  
 Surveys  
 Total Time : 6.0

## Dense Molecular Gas Excitation in a z~4 AGN-Starburst Galaxy

### Abstract:

High-z IR-luminous galaxies represent a major starburst phase in the formation of spheroidal galaxies. Dense gas tracers such as HCN, HCO+, and HNC are important to understand the physical properties and chemical composition of molecular cloud cores, the birth sites of stars. To better understand the properties of the dense molecular ISM phase of galaxies in the early universe, we here study, for the first time, the excitation of multiple dense gas tracers in a z~4 galaxy. We have recently used the vast 2GHz bandwidth of the EVLA to simultaneously observe HCN, HCO+, HNC, C2H, and H2O in the FIR-luminous z=3.911 quasar APM 08279+5255, at least tentatively detecting all lines. This makes for the most spectacular EVLA spectrum obtained at high-z to date (a clear science demonstrator for future "molecular line surveys" in high-z galaxies), but due to a correlator problem, is missing two-thirds of the requested on source time. To achieve rapid, timely publication, we here request to replace the missing data. We have complementing higher-J line data to constrain the excitation ladders of HCN, HCO+, HNC, and H2O, ie., the physical and chemical properties of the gas.

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### Related proposals:

AR692, AR753

### Joint:

Not a Joint Proposal

### Observing type(s):

Spectroscopy

**VLA Resources**

Name	Conf.	Frontend & Backend	Setup
apm_res	Any	Ka Band 0.9 cm 26500 - 40000 MHz WIDAR OSRO1: 2 Subbands/Full polz	Rest frequencies: 36451.8 MHz Subband Bandwidth: 128.0 MHz No. of Channels: 64 Poln. products: 4.0 Channel Width: 2000.0 kHz Total Bandwidth: 2,048.00 MHz

**Sources:**

Name	Position		Velocity		Group
apm08279+5255	Coordinate System	Equatorial	Convention	Optical	apm
	Equinox	J2000			
	Right Ascension	08:31:41.69 00:00:00.0	Ref. Frame	Barycentric	
	Declination	+52:45:17.5 00:00:00.0	Redshift	3.91220	

**Sessions:**

Name	Session Time (hours)	Repeat	Separation	LST minimum	LST maximum	Elevation Minimum
apm_ses	3.00	2	0 day	02:30:00	14:30:00	30

**Session Constraints:**

Name	Constraints	Comments
apm_ses		rms for all sessions combined (including data from AR753 with 60uJy/bm rms), over 25MHz

**Session Source/Resource Pairs:**

Session Name	Source	Resource	Time	Figure of Merit	Subarray
apm_ses	apm08279+5255	apm_res	3.0 hour	0.035 mJy/bm	

Present for observation: no

Staff support: None

Plan of Dissertation: no