

Arecibo Observatory
William E. Gordon Telescope
Observing Time Request
COVER SHEET

Section I - General Information

Submitted for Sep 1 2012.

This proposal has been submitted before.

The previous proposal number is A2714.

Proposal Type:	Regular
General Category:	Astronomy
Sub-Category:	Spectroscopy
Observation Category:	Extragalactic
Time Requested this semester:	90.75
Hours already used for this project:	0
Additional Hours required to complete project:	
Minimum Useful Time:	2.75 hr
Expected Data Storage:	less than 100 GB

Proposal Title: A Deep Arecibo 1 to 10 GHz Spectral Scan of Arp 220

ABSTRACT:

Following our earlier, shallow Arecibo spectral scan of Arp 220, we propose a follow-up, deep survey using the Mock spectrometer in “single-pixel” mode. This should more than double the signal-to-noise ratio of the data, and among the expected detection of a large number of new molecular lines, we anticipate species and isotopologues that will be new for these frequencies. The results will contribute to our understanding of the physical and chemical conditions in the central regions of this prototype Ultra Luminous Infra-Red Galaxy (ULIRG). Essentially the whole frequency range between 1.1 and 10.0 GHz will be searched with noise levels at, and below, $\sim 60 \mu\text{Jy beam}^{-1}$ for a velocity resolution of 30 kms^{-1} . A total of 90 hr observing time is requested.

Outreach Abstract:

We propose using the world’s largest radio telescope between 1 and 10 GHz to discover new spectral lines due to molecules and ionized hydrogen atoms in the prototype ultra-luminous infra-red galaxy, Arp 220. This object represents the collisional merger of a pair of galaxies, and is forming stars at about 100 times the rate of our own Milky Way. Our recent “first-look” survey of Arp 220 discovered, amongst other species, the prebiotic molecule methanimine (CH_2NH), and transitions of hydrogen cyanide (HCN) previously unseen at radio wavelengths. We expect equally exciting discoveries from this much deeper survey. The results will be used to understand the physical and chemical conditions in the central regions of this unique object.

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This work is not part of a thesis.

Remote Observing Request

- Observer will travel to AO
 Remote Observing
 In Absentia (instructions to operator)

Section II - Time Request

The following times are in LST.

For these observations night-time is required.

Begin – End Interval–Interval	Days Needed at This Interval
14:15 – 17:00	33
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Time Constraints (Must Be Justified in the Proposal Text)

Night time only to obtain the best possible spectral baselines.

Section III - Instruments Needed

L-wide C S-low X-band S-high C-high

Atmospheric Observation Instruments:

Special Equipment or setup: All receivers requested have equal priority, but not all need to be available at the same time.

Section IV - RFI Considerations

Frequency Ranges Planned

1100 - 10,000

This proposal requires Iridium RFI protection at 1612 MHz between 10pm and 6am EST.

This proposal requires coordination with Punta Salinas radar within the band 1222-1381 MHz..

This proposal requires coordination with GPS L3 at 1381 MHz.

Section V - Observing List

Target List

Arp220 15 34 57.3 +23 30 11

BP Cal 15 31 50.7 +24 02 43