

## Technical Page

Proposal Type: Regular  
 General Category: Astronomy  
 Sub-Category: Spectroscopy  
 Observation Category: Extragalactic  
 Total Time Requested: 28 Hours  
 Minimum Useful Time: 2 hours

**Proposal Title:** Probing the ISM of Arp 220 – A Cm-Wavelength Spectral-line Census

*ABSTRACT:*

We propose making an Arecibo spectral-line census for the prototype ULIRG, Arp 220, to investigate its various atomic/molecular-line transitions (both in emission and absorption) using full coverage of L-band and from 3 to 10 GHz. Included are a huge number of Radio Recombinations Lines (RRLs) to better constrain RRL emission models, while the molecular-line census will allow better understanding of nuclear starbursts in ULIRGs. Within this census, we will observe the 6.7-GHz methanol maser line, as yet undetected beyond the Local Group. This will determine whether methanol masers in ULIRGs exhibit kilo/megamasing compared to Galactic examples, as with 18-cm OH. Although scientifically focused, the project also addresses several technical objectives. Arp 220 being a strong continuum emitter, we will investigate the necessity of Double Position Switching (commonly used at L-band) for frequencies between 2 and 10 GHz. Moreover, considering the great Arp-220 line-widths and the multiple transitions of some lines, including RRLs, we will use the project to “shake down” the 8-subcorrelator (800-MHz bandwidth) single-pixel capability of the WAPP spectrometer, which is just being implemented.

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### Remote Observing Request

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

### Instrument Setup

L-wide            C            X-high   S-high   C-high

**Atmospheric Observation Instruments:**

**Special Equipment or setup:** This proposal requires the use of the 800-MHz, single-pixel capability of the WAPPs to be in place before it can commence (will require double of the requested telescope time otherwise).

## **RFI Considerations**

### **Frequency Ranges Planned**

1100 - 10,000 MHz

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.