

## Technical Page

This proposal has not been submitted before.

Proposal Type: Regular  
 General Category: Astronomy  
 Sub-Category: Spectroscopy  
 Observation Category: Stellar astrophysics: pre-PNe  
 Total Time Requested: 4.5 Hours  
 Minimum Useful Time: 1h

**Proposal Title:** Hydroxyl Masers in the Prototypical Pre-Planetary Nebula CRL 618

**ABSTRACT:**

Using the Arecibo Telescope, we detected 4765MHz excited OH emission (most likely a maser) toward the prototypical pre-Planetary Nebula (PPN) CRL618. This is the first detection of the 4765MHz OH transition in a late type stellar object, and only one of a few excited OH transitions detected in Asymptotic Giant Branch (AGB) to Planetary Nebula objects. This detection is particularly interesting because CRL618 is a carbon-rich PPN where oxygen-based species are not expected, and the putative maser is highly blueshifted with respect to systemic velocity, which suggests that the emission is associated with the powerful molecular jets/outflows in the region. We propose to confirm this detection, and to observe all other OH transitions accessible with Arecibo to model the 4765MHz OH maser. Arecibo observations are needed because the lines will likely be weak and variable.

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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-band                  C-high

### Atmospheric Observation Instruments:

**Special Equipment or setup:** none

## RFI Considerations

### Frequency Ranges Planned

NOTE: coordination with Punta Salinas and GPS L3 is desirable, but not critical for the scientific goals of the proposal.

OH transitions:

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1611 - 1613  
1664 - 1666  
1666 - 1668  
1719 - 1721  
4658 - 4662  
4748 - 4752  
4763 - 4767  
6013 - 6019  
6027 - 6033  
6032 - 6038  
6046 - 6052  
7746 - 7752  
7758 - 7764  
7817 - 7823  
7828 - 7834  
8115 - 8121  
8132 - 8138  
8186 - 8192  
8204 - 8211  
8500 - 8506  
8531 - 8537  
8577 - 8583  
8608 - 8614

Not critical for science goals:

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1266 - 1268  
1293 - 1295  
1419 - 1421  
1627 - 1629  
4495 - 4499  
4616 - 4620  
4742 - 4746  
4827 - 4831  
4872 - 4876  
5624 - 5630  
5777 - 5783  
6275 - 6281  
6665 - 6671  
7322 - 7328

7340 - 7346  
7345 - 7351  
7984 - 7990

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.