

## Technical Page

This proposal has not been submitted before.

Proposal Type: Regular  
 General Category: Astronomy  
 Sub-Category: Spectroscopy  
 Observation Category: Galactic  
 Total Time Requested: 26 Hours  
 Minimum Useful Time: 2hr

**Proposal Title:** The evolution of massive Hi-GAL clumps towards high-mass stars: constraints on physical parameters from the H<sub>2</sub>CO 6-cm transition

*ABSTRACT:*

The Hi-GAL survey gives us a unique opportunity to study the process by which molecular clouds condense into clumps and cores, and then into massive stars. Our recent discovery with the Arecibo telescope (A2712) of a previously unknown population of low-brightness ( $< 0.1\text{Jy}$ ) 6.7-GHz methanol masers in a sample of Hi-GAL massive clumps, has lent support to the idea that methanol masers may be exclusively associated with the early phases of massive star formation. We now want to further study these objects by constraining their physical and kinematical parameters. We thus propose to use the 6-cm H<sub>2</sub>CO K-doublet transition and the beam-matched 2-cm transition (with the GBT) in order to derive the density in these sources. Other kinematical data will be obtained by observing various RRLs. We will also search for the uncommon H<sub>2</sub>CO 6-cm emission and for variability in the already observed 6.7-GHz weak methanol masers.

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### Remote Observing Request

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

### Instrument Setup

C

**Atmospheric Observation Instruments:**

**Special Equipment or setup:** none

**RFI Considerations**

**Frequency Ranges Planned**

4829 - 4877 MHz