Proposal Title: Discovering Milky Way HII Regions

ABSTRACT:

We are finding a large population of previously unknown Galactic HII regions using the GBT at X-band to discover recombination line (RRL) emission from these nebulae. Here we seek to extend our discovery survey by using the superior sensitivity of Arecibo to find nebulae that are too weak and too small to be detected by the GBT. Since HII region RRLs are optically thin at X-band we can discover HII regions across the entire Galactic disk. We can get a complete census of all nebulae ionized by single O-type stars in the survey zone. We will determine the nebular kinematic distances, luminosities, metallicities (via the electron temperature, Te) and helium abundances (4He/H=Y). Both Te and Y provide important constraints on models for Galactic chemical evolution, GCE, and about 10% of these new nebulae will be located in the GCE-critical region beyond the Solar orbit.

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Remote Observing Request

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

Instrument Setup

- X-high

Atmospheric Observation Instruments:

Special Equipment or setup: We need to measure the line-to-continuum ratios for our HII regions so will be interleaving spectral line and continuum observations. We have debugged this process during
previous Arecibo experiments. We have all the necessary special IDL software to monitor and analyze line and continuum data. This software was written and debugged for programs A1704, A1804, and A2351.

RFI Considerations

Frequency Ranges Planned

25 MHz BW centered at: 9175.6, 8874.8, 8587.0, 8311.5 MHz