Proposal Type: Long-term  
General Category: Astronomy  
Sub-Category: Spectroscopy  
Observation Category: Extragalactic  
Total Time Requested: 100 (30 spread over 2 yr + 70) Hours  
Minimum Useful Time: 2.5 hr

Proposal Title: A Remarkable Spectral Line/Continuum Outburst in LIRG NGC 660

ABSTRACT:
Arecibo observations have detected a radio continuum and spectral-line outburst in the nearby peculiar galaxy, NGC 660. A new continuum component with GHz-Peaked Spectrum (GPS) emission ($S_{\text{peak}} \sim 0.5 \text{Jy at 5 GHz}$) has emerged between 2008.0 and 2012.0. This outburst has been mimicked by the parallel development of excited-OH maser emission/absorption in the 4660-, 4750- and 4765-MHz transitions. H$_2$CO absorption is also detected against the new continuum component. The likely nature of this event is either a SN explosion, or an outburst in nucleus of NGC660. Here we request observing time for two follow-up projects, (a) to monitor the line and continuum development of the outburst and, b) to make a full 1.1 to 10 GHz spectral scan of NGC660 to explore its currently rich molecular spectrum, and its recombination-line emission. This is effectively a “Target-of-Opportunity” experiment.

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>E-mail</th>
<th>Phone</th>
<th>Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Christopher J Salter</td>
<td>Arecibo Observatory</td>
<td><a href="mailto:csalter@naic.edu">csalter@naic.edu</a></td>
<td>787782612 ext 281</td>
<td>no</td>
</tr>
</tbody>
</table>

Remote Observing Request

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

Instrument Setup

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

Atmospheric Observation Instruments:

Special Equipment or setup: (1) We need as many of the listed receivers as possible to be available for each monitoring session (every 2 months). (2) For the spectral scans, the listed receivers will be used
in turn. While no single receiver has higher priority, not all need to be available for a given observing
session.

RFI Considerations

Frequency Ranges Planned

1100 - 10000

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.