Technical Page

Proposal Type: Regular
General Category: Astronomy
Sub-Category: Spectroscopy
Observation Category: Extragalactic
Total Time Requested: 40 Hours
Minimum Useful Time: 1 hour

Proposal Title: Probing fundamental constant evolution with conjugate OH lines.

ABSTRACT:
We propose to use the Arecibo L-band receiver to obtain deep, high resolution spectra in the redshifted 18cm satellite OH lines from the \( z = 0.247 \) source, PKS1413+135. The conjugate nature of the lines implies that these high precision redshift measurements can be used to probe changes in the fundamental constants \( \alpha, \mu \equiv m_e/m_p \) and \( g_p \) over the range \( 0 < z < 0.247 \). The observations will obtain 1\( \sigma \) sensitivities of \( \Delta \alpha/\alpha \sim 6 \times 10^{-7} \) and \( \Delta \mu/\mu \sim 1.2 \times 10^{-6} \) to fractional changes in \( \alpha \) and \( \mu \) respectively, the most sensitive from any astronomical technique and with the fewest known systematics. They will directly test our tentative detection of changes in these constants, a 3\( \sigma \) result with the Arecibo telescope and will provide an avenue to probe new and fundamental physics. Our total time request is 40 hours, including all calibration.

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>E-mail</th>
<th>Phone</th>
<th>Student</th>
</tr>
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<tbody>
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<td>15058357334</td>
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Remote Observing Request

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

Instrument Setup

- L-wide

Atmospheric Observation Instruments:

Special Equipment or setup: none

RFI Considerations
Frequency Ranges Planned

1138-1382

This proposal requires coordination with Punta Salinas radar within the band 1222-1381 MHz.
This proposal requires coordination with GPS L3 at 1381 MHz.