

## 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.

| Name           | Institution                          | E-mail                | Phone       | Student |
|----------------|--------------------------------------|-----------------------|-------------|---------|
| Nissim Kanekar | National Radio Astronomy Observatory | nkanekar@aoc.nrao.edu | 15058357334 | no      |

### Remote Observing Request

- 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.