

## Technical Page

Proposal Type: Regular  
 General Category: Astronomy  
 Sub-Category: Spectroscopy  
 Observation Category: Extragalactic  
 Total Time Requested: 160 Hours  
 Minimum Useful Time: 1 hour

**Proposal Title:** Do the fundamental constants change with time ?

*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 fine structure constant  $\alpha$ , the proton-electron mass ratio  $\mu$  and the proton gyromagnetic ratio  $g_p$  between  $z=0.247$  and today. The sensitivity of the proposed observations to changes in  $\alpha$  and  $g_p$  will be the highest from any astronomical technique and with the fewest systematics. The observations will directly confirm or deny the presence of a velocity offset between the satellite OH lines, tentatively detected (at  $2.6\sigma$  significance) in earlier Arecibo and WSRT spectra. If confirmed, this would be evidence for changes in  $\alpha$ ,  $\mu$  or  $g_p$ , providing an avenue to probe new and fundamental physics. Our total time request is 160 hours, including all calibration.

Name	Institution	E-mail	Phone	Student
Nissim Kanekar	National Radio Astronomy Observatory	nkanekar@nrao.edu	1-575-8357334	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.