Section I - General Information

Submitted for Sep 1 2014.

This proposal has not been submitted before.

Proposal Type: Regular
General Category: Astronomy
Sub-Category: Spectroscopy
Observation Category: Extragalactic
Time Requested this semester: 50
Hours already used for this project: 0
Additional Hours required to complete project: 
Minimum Useful Time: 45m
Expected Data Storage: less than 100 GB

Proposal Title: The gas mass of eleven damped Lyman-alpha systems at z<0.2

ABSTRACT:

Despite 25 years of studies of damped Lyman-alpha absorbers (DLAs), the precursors of today’s normal galaxies, the physical properties of the absorbers remain unknown. Low-redshift DLAs allow the exciting possibility of measuring the gas mass, size, and dynamical mass through HI-21cm emission studies, as well as their relations to the SFR, metallicity, etc. So far, this has only been possible for a single DLA, due to the lack of known low-z DLAs. We have searched the HST-COS archive to identify eleven DLAs at z<0.2, and propose here to use the Arecibo L-wide receiver to measure their gas masses via a search for redshifted HI-21cm emission. The observations have been planned so that even non-detections of HI emission will yield tight constraints on the HI mass, ruling out the possibility that the host galaxies are large spiral disks. We request 50 hours of time for this project.

Outreach Abstract:

Damped Lyman-alpha absorbers (DLAs) are galaxies selected by their absorption signatures in quasar absorption spectra. Since they are selected by absorption, DLA samples are not biased towards bright galaxies, but contain typical galaxies at any redshift. Understanding the nature of DLAs has hence long been an focus of research in galaxy evolution. Unfortunately, almost no DLAs have direct estimates of basic quantities like their mass and size, as few DLAs were known at low redshifts, and the sensitivity of today’s telescopes is not sufficient for measurements at significantly higher redshifts. The situation has changed with the new Cosmic Origins Spectrograph (COS) onboard the Hubble Space Telescope, whose far-ultraviolet sensitivity has made it far easier to detect low-redshift DLAs. We have identified eleven DLAs at z<0.2 in a search of the HST-COS archive and propose to use the Arecibo telescope to measure their HI masses.
Additional Authors

(3) J. X. Prochaska (University of California, Santa Cruz; e-mail: xavier@ucolick.org)
(4) Marcel Neeleman (University of California, San Diego; e-mail: mneeleman@physics.ucsd.edu; Graduate student)

This work is not part of a thesis.

Remote Observing Request

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

Section II - Time Request

The following times are in LST.

For these observations night-time is preferred.

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<th>Source</th>
<th>LST-Rise</th>
<th>LST-Set</th>
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Time Constraints (Must Be Justified in the Proposal Text)

The proposal requests 4.5 hours of time on each of eleven sources which are at different RAs. The LST rise and set times are listed below. We request night-time scheduling as far as possible, to reduce the chance that the observations might be affected by RFI.

Source LST-Rise LST-Set
Section III - Instruments Needed

L-wide

Atmospheric Observation Instruments:

Special Equipment or setup: none

Section IV - RFI Considerations

Frequency Ranges Planned

1180-1413

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

This proposal requires coordination with GPS L3 at 1381 MHz.

Section V - Observing List

Target List

Object RA Dec LST-Rise LST-Set
J0154+0448 01:54:28.0 04:48:18 00:56:01 02:53:33
J1435+3604 14:35:11.5 36:04:37 13:56:06 15:15:05

Details on redshifts and line frequencies are provided in a table with the scientific justification.