279.02 — The Arecibo Pisces-Perseus Supercluster Survey: Exploring the Large Scale Structure of the Local Universe

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The Pisces-Perseus Supercluster is one of the most massive and cosmologically significant structures in the local universe. The Arecibo Pisces-Perseus Supercluster Survey (APPSS) will provide observational constraints as to the mass-infall rate onto the main filament of the Supercluster through a detailed analysis of the mass and motion of galaxies within and around the cluster. The APPSS galaxy sample consists of over 2,000 galaxies detected during the ALFALFA survey (a blind, HI 21-cm emission line survey of the local universe) combined with galaxies identified through our recent targeted observing campaign - designed to probe below the HI mass cutoff of the ALFALFA survey. These APPSS-candidates were observed using the L-band Wide receiver at the Arecibo Observatory over the last 4 years; to date the APPSS targeted observing has led to an HI 21-cm emission line detection rate of ~70% - corresponding to ~500 galaxies with cz < 9,000 km/s. Combining these new observations with the ALFALFA galaxies gives a total of ~2,500 galaxies in the current APPSS sample. Here, we describe and demonstrate the methods used by the APPSS team to reduce and analyze these targeted observations and explore the properties of the entire APPSS galaxy sample (while comparing the properties of the ALFALFA galaxies with the detections from the APPSS targeted observing campaign). This work has been supported by NSF AST-1637339.

279.03 — Quantifying the performance of BAO reconstruction methods

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The baryon acoustic oscillation (BAO) technique is one of the most prominent probes of dark energy and will play a pivotal role in obtaining the tightest constraints on cosmology with the use of the large galaxy surveys in the next decade. Reconstructing the BAO peak reverses the effects of non-linear evolution and reduces redshift-space distortions, increasing the precision and accuracy of these measurements. Recently, there have been a number of alternative reconstruction algorithms proposed. We present a comparison of these algorithms, quantifying their performance on simulated data, from the aspects of the reconstructed field, power spectrum, correlation function, and BAO fitting.

279.04 — The Arecibo Pisces-Perseus Supercluster Survey: Characteristics of the APPSS Galaxy Population

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The Arecibo Pisces-Perseus Supercluster Survey(APPSS) aims to measure the infall and mass density along the PPS filament using red-shift independent distances obtained from the Baryonic Tully-Fisher Relation (BTFR). We will combine photometric data from the Sloan Digital Sky Survey with HI line spectroscopy obtained with the Arecibo telescope to derive BTFR distances and peculiar velocities over the PPS volume and its immediate foreground and background. To supplement the ALFALFA detections in the PPS volume, we have conducted new HI line observations with the Arecibo L-band Wide receiver system of blue, low surface brightness galaxies identified by their photometric properties in the Sloan Digital Sky Survey (SDSS). These targets are predicted to lie in the PPS volume but with HI masses of 8.0 < log HI mass < 9.0, putting them below the ALFALFA detection limit at that distance. We compare a preliminary sample of 634 galaxies detected as part from the APPSS survey with the main ALFALFA survey and other public catalogs of local galaxies, confirming that the new APPSS HI line detections are rotation-dominated, HI bearing galaxies with low stellar mass. Nearly all are star-forming, bluer, and of lower surface brightness, extinction and metallicity than optically selected samples. Preliminary BTFRs were calculated for both APPSS and ALFALFA galaxies and compared with BTFRs of simulated galaxies similar to those found in APPSS and ALFALFA using simulations such as IllustrisTNG (see poster by J. Borden). This work has been supported by NSF/AST-1714828 and the Brinson Foundation.

279.05 — The Arecibo Pisces-Perseus Supercluster Survey: Applying the Baryonic Tully-Fisher Relation

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The Arecibo Pisces-Perseus Supercluster Survey (APPSS) will map out infall to the Pisces-Perseus Supercluster filament using redshift-independent distances from the Baryonic Tully-Fisher Relation (BTFR). Here we examine the properties of outliers to the BTFR, with an emphasis on low mass galaxies. Our goal is partly to determine which galaxies should be excluded from our analysis in order to use the BTFR to obtain accurate distances, and partly to understand the dynamical properties of this population of galaxies. This work has been supported by NSF grant AST-1637339.

279.06 — Tip of the Red Giant Branch Distances to Nearby Galaxies

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The Extragalactic Distance Database (EDD) was created as a repository for high-quality, redshift-independent distances to nearby galaxies. Here we provide a decadal update to the color magnitude diagrams/tip of the red giant branch distances (CMDs/TRGB) catalog on EDD. The catalog now contains photometry and distances for nearly 500 galaxies, doubling the initial release. The TRGB method has allowed us to reveal the dominant large-scale motions in the Local Volume (< 10 Mpc), a region for which we are nearing 75% distance completion. We are also using it to investigate the discrepancies in the local versus cosmological determinations of the Hubble Constant, which may have large implications for the current ΛCDM model. The information we have on the stellar content of nearby galaxies can also be used to determine their recent star formation histories, which will provide important insight into how galaxies evolve in a wide range of environments. In the upcoming decade, JWST and WFIRST will help us to determine TRGB distances to a much larger sample of galaxies, allowing for even more transformative science.

279.07 — Galaxy Alignment with Surrounding Large-Scale Structure

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Galaxy alignments can shed light on the intrinsic properties of the cosmic structure and help make the weak gravitational lensing measurements better by reducing the contamination in weak lensing due to intrinsic alignments. From tidal torque theory, one can expect alignment of the long axis of a target galaxy's image with that of its surrounding galaxy distribution due to gravitational interactions between a galaxy and its surrounding structure. Using a sample of ~400,000 low redshift ($0.02 < z < 0.25$) spectroscopic galaxies from the Sloan Legacy Survey, we study alignment of these targets with their surrounding galaxy distributions. We define the alignment angle, ranging from 0° to 90°, as the angle between long axes of target galaxy image and its surrounding galaxy distribution shape. We further focus on how the alignment depends on the properties of target galaxies: color, luminosity, offset between center of the surrounding galaxy distribution and target galaxy, radius of the surrounding distribution, and the number of surrounding galaxies. It is evident that the luminous red galaxies show the highest parallel alignment (at a 6σ significance level) on average with their surrounding environment. However, there is no significant correlation between the alignment angle and the number of surrounding galaxies or the offset between center of the surrounding galaxy distribution and target galaxy. When looking at alignment of a luminous red target galaxy with its surrounding structure out to a projected distance rp, the alignment is greatest (at only 2σ significance level) for rp ~ 7 Mpc. To further investigate this dependence of alignment on the surrounding radius, we look at alignment of position angle of the target galaxy, inner surrounding structure, and outer surrounding structure, making a division at 15 Mpc. In general, this study shows that luminous red galaxies at low redshifts tend to align parallel with their surrounding structure within projected distance rp = 30 Mpc, with the strongest alignment signal at rp ~ 7 Mpc. By comparison, the faint red, luminous blue, or faint blue galaxies don't show a significant alignment with their surrounding structure.

279.08 — Secular Extragalactic Parallax: Measurement Methods and Predictions for Gaia

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Secular extragalactic parallax caused by the solar system's velocity relative to the cosmic microwave background rest frame may be observable as a dipole proper motion field for nearby galaxies. Nearby