"Periphery of Disks", 3-6 Nov. 2014, Sydney - Gas in the Periphery
Abstracts

Name: Tom Oosterloo (R)
Title: Extra-Planar Gas: Past, Present and Future

Name: Lia Athanassoula (R)
Title: The Periphery Of Disks: The Simulation Perspective

Name: Paolo Serra (C)
Title: Large Neutral Hydrogen Discs In Early-Type Galaxies

Galaxy discs are an obvious constituent of spiral galaxies, and most extragalactic astronomers would immediately think about these galaxies in relation to the study of the periphery of discs. Yet, recent work suggests that most early-type galaxies host a stellar disc too. Even more surprisingly, a significant fraction of these galaxies ($\sim$1/4 outside galaxy clusters) host a disc of neutral hydrogen gas, which is typically much more extended than the stellar disc. How these discs formed is still a mystery, but they represent undoubtedly a key observable for studying the periphery of early-type galaxy discs. In this talk I will summarise recent results on this surprising systems obtained as part of the Atlas3D survey. I will discuss their properties as a function of galaxy environment, their kinematical misalignment relative to the stellar disc, and present a comparison to predictions from hydrodynamical cosmological simulations.

Name: Kathrin Wolfinger (C)
Title: Signs of galaxy transformation in the Ursa Major supergroup

The Ursa Major cluster as previously defined in the literature (Tully et al. 1996) is actually comprised of several substructures (galaxy groups) that appear to be in an early evolutionary state in the process of merging. The individual galaxies show first signs of transformation occurring in the denser regions on the basis of their optical and HI properties. For example, HI deficient galaxies and galaxies showing disturbed HI content tend to reside in the galaxy groups, whereas galaxies with HI excess reside in the low density environment.

Name: Bärbel Koribalski (C)
Title: Large Hydrogen Disks

I will provide an overview of the largest known HI disks, both in terms of physical size as well as relative to the stellar disk of galaxies. Furthermore, I will highlight the morphology of the largest HI disk, including signatures of accretion, star formation, gas stripping and tidal interactions, all with respect to the galaxy surroundings.

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Name: Nadine Giese (C)
Title: Non-Parametric Characterization Of HI In Galaxies

Upcoming large blind HI surveys will provide tens of thousands of objects that allow for a proper statistical analysis of galaxy properties and their evolutionary state. The majority of objects will not have sufficient resolution for detailed modeling and should be analyzed with fast automatic methods. Existing non-parametric methods suffer from effects like dependence on the signal to noise or the resolution of objects. Moreover, they do not distinguish between inner and outer parts of the galaxies. We present new methods that address these issues. We show further how these methods can be advanced to use the full 3D information in a data cube and apply them to existing HI surveys such as Atlas3D and WHISP.

Name: Piet van der Kruit (I)
Title: Truncations And Warps In Disks Of Galaxies

It has been recognized around 1980 that stellar disks of edge-on spirals do not fade out radially but show a often rather sharp truncation. The majority of edge-ons show this behaviour. When the HI layer is more extensive than the stellar disk, a warp usually starts just beyond the truncation. The origin of these truncations is not clear, but the association with warps indicated that it probably is the extent of the disk after initial disk formation corresponding to the maximum specific angular momentum present and that the HI of the warp is matter that fell in later.

Truncations have been elusive in face-on or moderately inclined disks, due to the expected very faint surface brightness at which they are expected to occur. In a sample of galaxies from the IAC Stripe82 Legacy Project we have been able to detect truncations in three cases (out of 23) at about 29 mag/arcsec in r'. In most other cases a faint halo around the galaxy prevents the detection of truncations.

Name: Gerhardt Meurer (C)
Title: Galaxies As Clocks: The Radius Velocity Relationship Of HI Rich Galaxies

We show that the outskirts of HI rich galaxies obey a linear radius (R) versus rotational velocity (Vrot) relationship. This means they behave like clocks: they have the same orbital time of ∼800 Myr. The relationship is valid over the full range for which we have data - a factor of 30 from dwarf galaxies with R ∼1 kpc and Vrot ∼ 10 km/s to giant spirals with R = 30 kpc and Vrot = 300 km/s with an intrinsic scatter smaller than 40%. A linear $R - V_{rot}$ relationship is expected for Cold Dark Matter (CDM) dominated halos. The fact that the collapsed baryons of disk galaxies obey this relationship can be readily understood within the CDM paradigm. We show what is required for the situation to occur. The mean density within the outer radius is $3{\times}10^{-3}$ Msun/pc^3, requiring that the baryonic component of disk galaxies to have collapsed by a factor of ∼40. We outline the practical uses of the relationship and the implications for galaxy evolution.

Name: Anastasia Ponomareva (C)
Title: Tully-Fisher Relation And Rotation Curves Of Galaxies

To investigate the internal structure of galaxies we consider in detail the 3.6μm Tully-Fisher relation taking advantage of spatially resolved HI velocity fields. The main idea is to abandon the classical concept of the Tully-Fisher relation as the correlation using the width of global HI profile, and consider instead the detailed internal kinematics of gas in galaxies. An improved kinematic measure is implemented by deriving high-quality rotation curves, taking into account warps and streaming motions in the disk due to spiral arms or a bar.

Name: Peter Kamphuis (C)
Title: The Extended Disk Of ESO 92-G021

Mass distributions in the outer parts of galaxies is still a matter for debate. Especially in Early-Type galaxies it is difficult to trace the distributions beyond their stellar radius due to the lack of extended neutral hydrogen disks. Recent deep observations with ATCA of the S0 galaxy ESO 92-G021 show that this galaxy contains a very extended HI disk. Several different methods of analysis show that this disk has a remarkably regular structure and hence it is very suitable for mass decompositions. Here we will present, for the first time for an Early-Type galaxy, a detailed analysis of this disk and a subsequent mass decomposition, with a focus on the outer parts that normally cannot be probed in these galaxies.

Name: George Heald (I)
Title: HALOGAS And The Origin Of Extraplanar HI In Spiral Galaxies

Name: Marc Verheijen
Title: The Apertif medium-deep survey and the outskirts of HI disks

The Apertif medium-deep survey and the outskirts of HI disks as tracers of galaxy evolution in different cosmic environments.

Name: Megan Johnson (C)
Title: Mapping The Radio Continuum Halos In Nearby Spiral Galaxies With CHANG-ES

The Continuum HAlos in Nearby Galaxies - an EVLA Survey (CHANG-ES) is an international consortium designed to study the radio continuum halos and the disk-halo interface in a sample of 35 edge-on star forming nearby galaxies. The CHANG-ES project is using the newly upgraded Jansky Very Large Array to map full-stokes radio continuum at L-band (20 cm) and C-band (6 cm) in B- (L-band only), C-, and D-arrays. With these data, we aim to study a host of areas including, Faraday rotation and the origins of galactic magnetic fields, cosmic ray transport and wind speeds, the FIR - radio continuum correlation, and the origins of the gaseous halos and their physical properties. Here, we present some of the early science results as pertaining to the edges of star forming galaxy disks.

Name: Mary Putman (I)
Title: Gas on a Trip to the Disk

Name: Felix J. Lockman (C)
Title: Faint HI In The Local Group: The Smith Cloud And The M31-M33 Clouds

Recent observations in the 21cm line using the Green Bank Telescope have increased our understanding of low surface-brightness neutral gas in the halo of the Milky Way and between the galaxies M31 and M33 in the Local Group. The Smith high-velocity cloud is in the process of adding several million solar masses of gas to the halo of the Milky Way; it may be the baryonic component of a dark matter sub-halo. The HI clouds between M31 and M33 share some characteristics of the Smith Cloud in their size and neutral mass, but their connection to any single galaxy is uncertain. The ability to detect 21cm emission lines at a level $\log10(N_H)\sim17.0$ may well change our understanding of the periphery of spiral galaxies.

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Name: Naomi McClure-Griffiths (C)
Title: The Disk-Halo Interaction In The Milky Way

Name: Alex Hill (C)
Title: Magnetic Fields In High Velocity Clouds

Many high velocity clouds (HVCs) – clouds with velocities inconsistent with Galactic rotation – trace infall into the Galaxy and contribute to ongoing star formation. Hydrodynamic simulations indicate that HVCs should lost most of their HI as they travel through the Galactic halo, making it unclear how the gas can reach the disk and fuel star formation. I will present recent measurements of magnetic fields of $>\sim 6$ microGauss in two HVCs using Faraday rotation towards extragalactic radio sources. These fields are strong enough to stabilise both HVCs against disruption. In one of these HVCs, the Smith Cloud, the rotation measure signature is better-correlated with Halpha emission than with HI, suggesting that it traces magnetionised gas which is otherwise difficult to detect.

Name: Antonino Marasco (C)
Title: The Formation Of The High-Velocity Clouds Of The Milky Way

High-Velocity Clouds (HVCs) are multiphase systems located in the halo of our Galaxy and detected in both HI emission and ion absorption lines at large (> 100 km/s) line-of-sight velocities. The origin of these systems is unclear. We used a galactic fountain model where cold and metal-rich gas clouds, ejected from the disk of the Milky Way by supernova feedback, trigger the cooling of the hot and metal-poor circumgalactic medium. I show that such a model produces multiphase gas whose kinematics and column density are in excellent agreement with those determined by absorption-line studies of HVCs. In addition, I will present a new model for the origin of the prototypical HI HVC complex C as triggered by a superbubble explosion occurred in the Cygnus-Outer arm about 150 Myr ago. This model reproduces remarkably well the detailed HI emission, the distance and the metallicity of this complex.

Name: Federico Marinacci (I)
Title: The Importance Of Galactic Fountain In Galaxy Evolution

Galactic fountain plays an important role in galaxy evolution since it ultimately influences the distribution and the chemical evolution of the gas in star-forming galaxies. An important aspect of the fountain cycle is that the fountain material must interact with the hot and diffuse ambient gas (the so-called corona) surrounding the disk. In this talk, I will focus on the idea that this interaction leads to a positive feedback scenario in which the passage of galactic fountain clouds through the corona triggers the accretion of the hot coronal gas onto the star-forming disk. In particular, I will present hydrodynamic simulations showing that the coronal gas cools efficiently in the turbulent wakes that form behind the fountain clouds as they travel through the ambient medium. The rate at which the coronal gas condenses in the wakes matches quite well the star formation rate in the disk, with crucial implications for the evolution of Milky-Way-type galaxies. Finally, I will briefly discuss some preliminary results about including thermal conduction in the simulations.

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Abstracts

Name: Tiffany Day (C)
Title: The Flows Of Neutral Hydrogen In The Grand Design Spiral Galaxy M83

A key ingredient in understanding galaxy evolution is to determine the presence and structure of extra-planar HI gas within a galaxy. Studying the HI gas flows around a single star formation structure, instead of galaxy wide, can provide crucial insight into how gas is ejected from the plane. The spiral arms of M83 provide an excellent opportunity for studying such flows. I will present an analysis of the distribution and kinematics of HI in M83, focussing on the inner disc and spiral arms, using combined data collected in The HI Nearby Galaxy Survey and The Local Volume HI Survey. The unprecedented sensitivity enables the separation of radial and vertical motions of gas in and around the arms of this grand design spiral, revealing clues to the origin of gaseous thick discs and providing insight into the transport of gas from the outer regions of a galaxy to the inner regions.

Name: Chris Howk (I)
Title: Tracing Star Formation-Driven Flows Into The Thick Disk And Circumgalactic Medium

The flow of gas in and out of galaxies regulates star formation and likely shapes observed galaxy scaling relations, including the mass-metallicity relation and properties of the star forming sequence. I'll discuss one tracer of star-formation driven outflows from galaxy disks: extraplanar dust. Observations of dust in the interstellar thick disks of spiral galaxies have revealed a complex, multiphase medium (including cold, dense gas) populated largely by the feedback-fueled galactic fountain. Evidence for dust extending well into the halos of galaxies may be revealing material driven outward by strong winds and radiation pressure over the history of the galaxy.

Name: Mike Anderson (I)
Title: The Periphery of Disks as seen in X-rays

The circumgalactic medium is multiphase, and each phase of the CGM can contribute inflowing material to the galactic disk. In this talk I review our current understanding of the hot ($T > 10^6$ K) phase of the CGM around spiral galaxies. This includes the theoretical expectations for the presence and origin of hot, X-ray emitting halos, as well as a number of recent detections of these halos around massive spiral galaxies, using both targeted observations and stacking analyses. While there remains considerable uncertainty about the properties of the hot gas at large radii, within 50 kpc our knowledge is much more robust, and I present estimates of important quantities like the gas mass and the cooling rate. Finally, I conclude by discussing future prospects for improving our knowledge of the hot CGM, as well as potential interactions between the hot phase and cooler phases.

Name: Nicolas Lehner (C)
Title: Unveiling The Massive Reserves Of Gas And Metals Around Galaxies

Large-scale flows in the CGM strongly affect the shape, structure, and evolution of galaxies. While galaxy outflows are observed nearly ubiquitously in the universe at any redshift, intergalactic filaments feeding galaxies have been mostly a theoretical conjecture for the last decade. Using HI selected absorbers with COS observations, we have determined the metallicity distribution function of the CGM at z<1. I will show it is bimodal with metal-poor and metal-rich branches peaking at about 3% and 40% solar metallicity. The circumgalactic gas is found to have a mass comparable to that of all the gas within the galaxies themselves, thus providing a substantial reservoir for fueling continued star formation in modern galaxies. These results show that there is a not only a significant mass of metal-rich gas in the CGM of z<1 galaxies, but also a previously undiscovered cold, metal-poor component. I will argue the metal poor component very likely traces cold streams onto galaxies. I will conclude that to have a complete picture of the CGM, we need to know the HI content of the CGM, but also HII and the metal metal content. To further support my conclusion, I will zoom in on the Andromeda galaxy where I will demonstrate the existence of a massive halo around the galaxy Andromeda extending to its virial radius revealed by metal-line absorption.

Name: Emma Ryan-Weber (I)
Title: Galaxy Haloes at High Redshift: Outflow vs Pre-enrichment

At z$\sim$ 3 there exist a very clear relationship between massive UV-bright galaxies (Lyman break galaxies) and their metal enriched haloes. I will present results from our search for Lyman break galaxies and Lyman-alpha emitters around two of the highest column density, highest redshift (z$\sim$5.7) metal absorbers known to-date (Diaz et al 2014a; 2014b). In contrast to the picture at z$\sim$3, we find that these absorbers prefer the lower density environment of Lyman-alpha emitters. Furthermore, the closest galaxy-absorber pair has a transverse distance of over 200 physical kpc leading to conclusion that these metals cannot have resulted from an outflow from the nearest detected galaxy, but must have injected at an early time or by a fainter galaxy.

Name: Joss Bland-Hawthorn (I)
Title: The Huntsman Array and Dragonfly

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Abstracts

Name: David Thilker (I)
Title: Star Formation At The Disk Periphery And Beyond

The discovery of extended ultraviolet disk (XUV-disk) galaxies early in the GALEX mission invigorated the study of star formation in the low density regime most frequently encountered at the periphery of galaxies. However, initial results concerning the XUV-disk population were based on a rather small set of objects with potential bias. The situation has improved greatly with GALEX UV observations now available for many thousand nearby galaxies – forming a comprehensive, statistically significant sample in which to probe this mode of star formation / disk growth. Highlights from this new, broader view include the existence of early type galaxies with XUV-disks and giant, low surface brightness disk galaxies apparently caught in formation. We will review the findings of an updated census of XUV-disks based on the latest data release and include results from associated programs on HST and Pan-STARRS1 if time permits.

Name: Natsuko Izumi(C)
Title: Star Formation In The Extreme Outer Galaxy: Induced By HVC Impacting On The Galactic Disk?

We report the discovery of star formation activity in perhaps the most distant molecular cloud in the extreme outer Galaxy. We performed deep near infrared imaging with the Subaru 8.2 m telescope and found two young embedded clusters at two CO peaks within "Digel Cloud 1" at the kinematic distance of D = 16 kpc (Galactocentric radius Rg = 22 kpc). On the sky, Cloud 1 is located very close to the HI peak of high-velocity cloud (HVC) Complex H. There are some HI intermediate velocity structures between the Complex H and the Galactic disk, which indicates an interaction between them. We suggest the possibility that Complex H impacting on the Galactic disk has triggered star formation in Cloud 1 as well as the formation of the Cloud 1 molecular cloud. Such process may have occurred frequently in the early phase of the formation of the Galaxy.

Name: Aaron E. Watkins (C)
Title: Probing Star Formation In Outer Disks Using Ultra-Deep Broadband And Halpha Imaging

We present the results of deep optical imaging (muB 30) of several nearby spiral galaxies in Johnson B and V. We are able to measure integrated colors of stars in the extreme outer disks and in extended tidal streams, probing the nature of stellar populations and star formation in the lowest density environments. We find that the colors of such features in even some clearly interacting galaxies (e.g. M51) do not imply significant recent star formation, which has implications for the efficacy of tidal dwarf formation. These results can also further constrain models of interactions, as well as quantities such as the merger rate in the local universe. Finally, we present an ultra-deep, wide-field H-alpha image of the nearby spiral galaxy M101, which reveals low level, ongoing star formation extending to 40 kpc that is likely fuelling the recently discovered extended ultraviolet (XUV) disk.

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Name: Mustafa Kursad Yildiz (C)
Title: Star Formation In The Outer Regions Of Early Type Galaxies

Observations of neutral hydrogen (HI) and molecular gas have shown that 50% of early-type galaxies (ETGs) contain some cold gas. Molecular gas is always found in small gas discs in the central region and is linked to small amounts of star formation. In contrast, in ∼20% of ETGs outside clusters we find the HI to be distributed in a low-column density disc or ring with typical sizes of many tens of kpc, much larger than the stellar body.

The main goal of this work is to understand the impact of these large HI discs on the host galaxy, and whether these galaxies are slowly transitioning towards a spiral morphology via low-level star formation in the HI disc. We study star formation (efficiency) in these gas discs and rings using GALEX and deep optical imaging data. Here, we will show first results of this work, which is part of the ATLAS3D project.

Name: Olga Silchenko (C)
Title: Outer Rings In Lenticular Galaxies: Formed By Accretion?

Outer stellar rings are a common feature of lenticular galaxy disks: according to the statistics by Comeron et al. (2014), half of all S0s have outer stellar rings. Meantime, the bar frequency falls just toward this morphological type: only 35% of all S0s demonstrate bar presence in the NIR while among spirals this fraction is 80%. These two opposite tendencies provoke doubts about the resonance origin of a bulk of outer rings. We have undertaken spectral study of a small sample of the S0s with the outer rings seen in UV. Spectral-line diagnostics demonstrate a variety of excitation mechanisms for the outer starforming rings. When we can estimate the oxygen abundance, it is always close to the solar one that is unexpected taking into account large radial distances of the rings. The gas kinematics is often decoupled from the stellar one. I discuss possible origin of the outer ring structures in S0 galaxies and their role as a signature of the evolution paths.

Name: Christer Sandin (C)
Title: To Which Extent Does Diffuse Scattered Light Explain Halos And Thick Disks Around Galaxies?

Studies of halos and thick discs around galaxies declare, with few exceptions, that their results are unaffected by diffuse scattered light. My scrutiny of the diffuse scattered light around galaxies shows, unexpectedly, that also its faintest components contribute to extended structures of integrated light (arXiv:1406.5508). Additionally, observed structures can vary a lot, because the scattered light profile changes with time and observing conditions. I will demonstrate that scattered light can play a dominating role in explaining existing photometric observations of diffuse thick discs and halos; I consider edge-on and face-on disc galaxies, elliptical galaxies, and also hosts around blue compact galaxies. My research suggests that many diffuse halos and thick discs are scattered light. Only after the scattered-light component is correctly removed can we study the real structure.

Name: Kate Rubin (I)
Title: Observational Evidence For Cool Gas Accretion Onto Star-Forming Galaxies

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Name: Anastasia Kasparova (C)
Title: A Portrait Of Malin 2: A Case Study Of A Giant Low Surface Brightness Galaxy

The aim of this work is to design a coherent picture of the exotic galaxy Malin 2 belonging to the class of low surface brightness galaxies that is expected to have disc properties like peripheries of normal spirals. One of the unique its peculiarities is the apparent misbalance of interstellar media, namely, the molecular gas excess in relation to atomic gas for given values of the gas equilibrium turbulent pressure. We discuss that it can be explained by the presence of a significant portion of the dark gas unobserved by CO lines and 21 cm. We also argue that the massive and rarefied dark halo which formed before the disc component describes all the observed properties of Malin 2 well and we find that there is no need to assume additional catastrophic scenarios (such as major merging) proposed previously in order to explain the origin of giant LSB galaxies.

Name: Ángel López-Sánchez (C)
Title: Ionized And Neutral Gas In The XUV Discs Of Nearby Spiral Galaxies

We are using 2dF/AAOmega at the 3.9m Anglo-Australian Telescope to perform multi-object fibre spectroscopy of UV-bright regions within and surrounding gas-rich spiral galaxies of the Local Volume showing an extended UV-disc (XUV) well beyond their B25 radius. I will present the results of the analysis of the NGC 1512/1510 and M 83 systems. We confirm the detection of ionized gas in the majority of the observed UV-bright regions and characterize their physical properties, chemical abundances, and kinematics. This study allows us to find satellite dwarf galaxies and confirm tidal dwarf candidates. Combining these results with our HI data from the "Local Volume HI Survey" (LVHIS) and the available UV (GALEX) data provides key clues about local star-formation processes, the interplay between the ISM and the IGM, the metal redistribution in the outer gaseous discs of spiral galaxies, the importance of galaxy interactions, the fate of the neutral gas, and the chemical evolution in nearby galaxies.

Name: Sarah Bruzzese (C)
Title: The Initial Mass Function And Star Formation Law In The Outer Disk Of NGC 2915

We present Hubble Space Telescope data of resolved stellar populations in the outer disk of NGC2915, a blue compact dwarf galaxy with an extended HI disk. These observations reveal a clumpy distribution of main-sequence stars, which we use to constrain the upper-end initial mass function (IMF) and star formation law (SFL) in the outer disk. Combining the observed data with previously published H observations we find the IMF to be deficient in high-mass stars compared to a Kroupa IMF, with the possibility of significant diffuse ionised gas or escaping ionising photons in this region. We also combine the HST data with HI imaging to determine the SFL in the outer disk. If the observed SFL holds to the edge of the observed HI disc then it contributes 11-28% of the total recent star formation in NGC 2915.

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Name: Matthew Smith (C)
Title: Dust, Star-Formation And The ISM In The Outskirts Of Galaxies

Dust grains have an important role in the star formation process, because they provide a vital cooling mechanism and are a catalyst for the conversion of atomic to molecular gas. Dust has only been directly detected in spiral galaxies out to approximately the standard optical radius. By combining the results of images made with the Herschel Space Observatory of 110 galaxies we detect the emission of a dust disk out to twice the optical radius. The dust temperature declines from ∼25K in the centre of the galaxy until the optical radius where the dust maintains a constant temperature of 15K. We combine UV data from GALEX with MIPS 24 micron data to produce a radial star-formation profile and IRAC 3.6 micron data to trace the distribution of stellar mass. Star-formation laws beyond the optical diameter may be different from central regions due to the far lower density environments. We find the radial distribution of dust is significantly different from the radial distribution of star-formation.

Name: O. Ivy Wong (C)
Title: The Effect Of Disk Stabilities On Star Formation Efficiencies

We present a multiwavelength study of the star formation efficiencies of a sample of star-forming nearby galaxies uniformly-selected across four magnitudes of HI-masses from the SINGG-SUNGG survey. Despite sampling all star-forming galaxies without biasing against size and surface brightness, we find that the star formation efficiencies are fairly uniform and span approximately a magnitude in star formation efficiencies. Using the Toomre Q-parameter to describe the stability of a galactic disk, we find that the uniformity of the star formation efficiency across stellar mass can be well-described by a constant-Q disk model.

Name: Anatoly Zasov (C)
Title: Midplane Volume Densities Of Galactic Discs And Star Formation At The Periphery Of Galaxies

On the example of concrete spiral galaxies it will be demonstrated the existence of well-defined connection between the efficiency of star formation (SFE) and stellar volume density ρ_* in the disc midplane, calculated for the equilibrium axisymmetric disc models. However this correlation disappears at the disc peripheries, where $\rho_* <\sim 10^{-24}$ g/cm^3. The relationship between SFE and the azimuthally averaged volume density of HI is more diffuse, evidently because of the irregular gas distribution. A possible role of various mechanisms which may be responsible for local growth of gas density and star formation in the low-dense gas layer will be shortly discussed, such as density waves, induced by non-axisymmetric dark halo, the existence of CO-silent molecular gas clouds, or the effects of environment.

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Abstracts

Name: Virginia Kilborn (R)
Title: The Effect Of Interactions And The IGM On The Outer Regions Of Disk Galaxies

Name: Jing Wang (C)
Title: The HI Environment Around Extremely HI-Rich Galaxies

We present a study of the HI environment around the HI-richest galaxies from the Bluedisk project and ALFALFA survey, with the aim of understanding the galactic disk formation with gas accretion in the local universe. We find that these galaxies have both larger number counts and higher values of overall HI mass of their less massive neighbours in the surroundings. We argue that both minor merger events and cooling from the hot halo are important processes in the gas accretion of these galaxies.

Name: Katharina Lutz (C)
Title: HI Tails And Star Formation In The Grus Quartet

The Grus quartet is a compact group of four large spirals. When observing the atomic gas (HI) content of this quartet, all four galaxies show various HI tails in the outskirts of their discs. These tails are most likely due to tidal interactions of the galaxies (Koribalski et al. 1996, Dahlem 2005). We make use of HI, Hα and UV observations to further investigate general properties of this peripheral atomic gas, to compare those properties to the star formation activity as well as the HI content of the host galaxy and, to search for star formation activity in the HI tails. Bringing together all those pieces

Name: Sebastian Haan (C)
Title: Measuring Ram Pressure Perturbations In The Outer Disks Of Galaxies

Deep radio-interferometric HI observations allow us to investigate the dynamical consequences of a typical interaction between the IGM and the outer regions of disk galaxies. We have devised a novel approach based on a kinematic measurement of ram pressure terms in HI velocity fields at IGM densities that are an order of magnitude lower than in galaxies that show ram pressure stripping (Haan & Braun, MNRAS, 2014; Haan & Braun, MNRAS Letters, 2014). This allows us to measure the three-dimensional vector of the galaxies' movement with respect to the rest-frame of the IGM, which might be used to reconstruct both the IGM density profile and individual member orbits within galaxy groups. Results for several local disk galaxies will be presented and I will discuss further implications of such interactions, which might be the main drivers for both non-planar (i.e. warps) and non-circular motions in the outer gas disks of galaxies.

Name: Tobias Westmeier (C)
Title: The Effects Of Ram Pressure In Group Environments

The extended neutral gas discs of galaxies are particularly sensitive tracers of interaction processes in group environments. I will present new results from a deep HI survey of the Sculptor group with the Parkes telescope in search of faint satellite galaxies and intergalactic gas clouds. Our initial results indicate that there is a lack of galaxies with low HI masses in the Sculptor group, raising the question of what mechanisms could have been involved in removing gas from galaxies. One such mechanism could be ram-pressure stripping. I will show evidence for ram pressure affecting and distorting the outer HI discs of some of the more massive Sculptor group galaxies and elaborate on the consequences of ram-pressure stripping for the evolution of galaxies in group environments.

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Name: Aeree Chung (I)
Title: In or Out? - Gas Accretion and Stripping in Galaxies and the Consequences

Galaxies may gain or lose gas while interacting with their surroundings. In particular low density gas in the form of atomic hydrogen (HI) can be quite easily accreted to or stripped from the periphery of galaxies. In this talk, I will present the examples of nearby galaxies that are undergoing HI accretion or stripping in a range of density environments. I will discuss how the modification of HI properties in the outer disk can propagate into the change of gas contents and star formation activities in the inner disk, and hence the galaxy evolution.

Name: Lister Staveley-Smith (C)
Title: Environmental Effects In Overdense Regions

Recent surveys such as the Arecibo Ultra Deep Survey (AUDS) allow us to measure the evolution of the cosmic HI density and the HI mass function in regions of different over density. I will describe some of these recent results in the context of early science plans for Wallaby on ASKAP.

Name: Lisa Harvey-Smith (I)
Title: ASKAP Early Results

Name: Jayaram Chengalur (I)
Title: Cold Atomic Gas In High Redshift Galaxies

Name: D.J. Pisano (C)
Title: Searching For Ongoing Accretion With The Green Bank Telescope

One of the key questions in astronomy today is how galaxies accrete the gas they need to fuel ongoing star formation. While many interferometric surveys have revealed populations of low mass HI clouds around galaxies, they have not found enough gas to sustain continued star formation. One possible explanation of this deficit is that this HI is extended and diffuse such that it is missed by interferometers. To rectify this problem, my collaborators and I are conducting a Green Bank Telescope (GBT) HI survey of the galaxies in the THINGS and HALOGAS samples. The GBTś unique design makes it the ideal single-dish telescope for observing low column density HI and makes it capable of detecting HI emission from analogs to Lyman limit systems. I will present the initial results from our search for ongoing accretion from the cosmic web, and I will detail our future plans.

Name: Erwin de Blok (C)
Title: Accretion Or Interaction In NGC 2403

One of the key questions in astronomy today is how galaxies accrete the gas they need to fuel ongoing star formation. While many interferometric surveys have revealed populations of low mass HI clouds around galaxies, they have not found enough gas to sustain continued star formation. One possible explanation of this deficit is that this HI is extended and diffuse such that it is missed by interferometers. To rectify this problem, my collaborators and I are conducting a Green Bank Telescope (GBT) HI survey of the galaxies in the THINGS and HALOGAS samples. The GBTś unique design makes it the ideal single-dish telescope for observing low column density HI and makes it capable of detecting HI emission from analogs to Lyman limit systems. I will present the initial results from our search for ongoing accretion from the cosmic web, and I will detail our future plans.

Name: Ioannis Bagetakos (C)
Title: A Multi-Wavelength View Of The ISM In NGC 2403

We have developed an objective, automated method to compare multi-wavelength images based on 2D pixel-by-pixel cross-correlations. We introduced a measure for the degree of correlation, Ccoef, which takes values from 1 (perfect correlation) to -1 (perfect anti-correlation). This we subsequently applied to NGC 2403, in a pilot project using HI data from THINGS, 8μm, 24μm, 70μm and Halpha; maps from SINGS, and FUV data from NGS. We produce spatially resolved cross-correlation maps, on scales of 250 pc to 1000 pc and radial profiles of the cross-correlation coefficients. To date no practical method has been deployed to compare maps across the electromagnetic spectrum of galaxies while preserving spatial information. I will present the results of our method and discuss its possible applications to the wealth of high resolution maps that have and will become available based on observations with the new generation of telescopes.

"Periphery of Disks", 3-6 Nov. 2014, Sydney Gas Flows: Feedback and Accretion
Abstracts

Name: Filippo Maccagni (C)
Title: May HI Clouds Trigger A Radio AGN?

Neutral hydrogen observations provide great insights in the study of Active Galactic Nuclei. Neutral hydrogen has been detected in the very inner regions of several radio galaxies, suggesting it could interact with the radio activity. Especially in young radio galaxies, the HI, inflowing or outflowing, can regulate the fueling of the AGN. The case of the young radio source PKS 1718-649 is of particular interest. In this talk, I present ATCA high-resolution observations of this galaxy and the modeling of its large-scale HI disk. I show how the kinematics of this disk excludes a major accretion event as the trigger of the nuclear activity. I also analyze the nature of the absorption lines. We may trace small clouds close to the nucleus, not following the regular rotation of the disk. This suggests that the AGN has been triggered by a small-scale phenomenon in the inner regions of the galaxy. These clouds may have had origin in the hot halo of the galaxy and then have fallen into the nucleus.

"Periphery of Disks", 3-6 Nov. 2014, Sydney Posters
Abstracts

Name: Ekaterina Chudakova
Title: The Thickness of Inner and Outer Stellar disks in Early-type Galaxies

We propose a new photometric method enabling the derivation of the relative thickness of a galactic disk from the two-dimensional surface-brightness distribution of the galaxy in the plane of the sky. We stress two distinct advantages of our method: firstly, it provides an individual estimate for every galaxy, beyond a statistical approach, and secondly, for the galaxies which orientation differs from edge-on it allows to confront its vertical structure with the radial brightness profile properties. The method is applied to a small sample of images from of the SDSS and S4G of disk galaxies with known radial piece-wise-exponential (with a flatter outer profile) surface-brightness distributions. The accuracy of data is sufficient to derive the thickness of both the inner and outer disks for a few galaxies. Matching the distribution of radial scale and relative thickness in inner and outer disks can lead to interesting conclusions about physics and origin of galactic disks.

Name: Gyula I. G. Józsa
Title: UGCA 105: A Dwarf With a Beard

Some galaxies exhibit "beards", a specific kinematic signature observed in their (neutral) gaseous component. With increasing height above the mid-plane the gas rotates slower than expected, such that spectra taken on positions along the major axis exhibit a faint tail towards the galaxies systemic velocity, and become more elongated than a simple fountain model would predict. These features have been brought into connection with gas infall, which could remove angular momentum from the high-latitude gas and could hence lead to the observed slowing. While studies of such anomalous gas have hitherto concentrated on large spiral galaxies, we have started to study the vertical kinematical structure of gas-rich dwarf galaxies, to investigate how it compares to the one of large (gas-rich) spirals. We present WSRT HI observations of UGCA 105, a dwarf galaxy of Magellanic type, showing very characteristic beard emission, and discuss a kinematical analysis of its HI disk.

Name: Se-Heon Oh

Title: WALLABY/DINGO Kinematic Parameterisation: a New Bayesian MCMC Tilted-ring Fitter

WALLABY/DINGO kinematic parameterisation: a new Bayesian MCMC tilted-ring fitter Abstract: The WALLABY kinematics working group has defined a detailed strategy to parameterise the kinematics of spatially resolved disk-dominated galaxies from the ASKAP WALLABY and DINGO surveys. We designed a conceptual pipeline for extracting reliable galaxy kinematics, utilising three algorithms: 2D tilted-ring fits and DISKFIT which operate on 2D velocity fields, and TIRIFIC which operates on 3D data cubes. For the 2D tilted-ring fits, we present a newly developed 2D tilted-ring fitting algorithm based on a Bayesian MCMC technique which enables us to derive rotation curves of galaxies in a fully automated manner. We discuss the performance of the new software using a set of sample galaxies from Local Volume HI Survey (LVHIS) as well as WALLABY-like model galaxies constructed using HI properties of galaxies taken from The HI Nearby Galaxy Survey (THINGS).

Name: Sinem Ozbilgen

Title: Is There a Third Parameter in the Tully-Fisher Relation?

The Tully Fisher Relation (TFR) is a scaling relation between the two observable parameters of spiral galaxies; absolute magnitude (or luminosity) and maximum rotational velocity. The TFR is primarily used to determine the distances of spiral galaxies thus, it is important to reduce the scatter in the relation. In this research, we observed a subset of HIPASS (HIParkes All-Sky Survey) galaxies with WiFeS (Wide-Field Spectrograph) on the Australian National University (ANU) 2.3m Telescope. Using the data, the velocity dispersions (σ) are calculated from the bulge of the spiral galaxies to find a third parameter in the Tully-Fisher relation (TFR). Since the circular velocity (Vc) is calculated from the disk of a galaxy, σ/Vc could be an indicator of morphology of a galaxy. Moreover, the slope of the TFR changes with the morphological type, therefore, σ/Vc is investigated as a third parameter to reduce the scatter in the TFR.

Name: Eon-Chang Sung

Title: A Study of a Tidally Interacting BCD Pair, ESO 435-IG20 and ESO 435-IG16

Blue Compact Dwarf galaxies (BCDs) are systems that recently have experienced the burst of star formation. As one of the causes for active star formation in BCDs, tidal interaction (fly-by or merger) has been suggested. A pair of BCDs, ESO 435-IG20 and ESO 435-IG16 are separated by only 80 kpc in projection at a similar redshift (at a 9 Mpc distance), and hence suspected to be a good example of such case. Intergalactic atomic hydrogen gas found in HIPASS survey is also suggestive of this hypothesis. In this study, we probe the HI morphology and kinematics of this BCD pair using ATCA HI data to study how responsible tidal interaction is in triggering star formation in these galaxies. We investigate various star formation tracers of the pair to study detailed interaction history.

Name: Thorsten Tepper-García

Title: VIrga: Mass-loading of Hot Gaseous Halos Via Gas Accretion

We present new simulations to illustrate how the lower hot gaseous halo (or corona) of a galaxy can become mass-loaded by infalling gas clouds. Our simulations show that the infalling neutral gas becomes almost fully ionised and thus invisible in HI on time scales on the order of 1 Gyr. This warm gas falls towards the galaxy but cools too slowly to accrete directly; we refer to this as the 'virga' process after a similar effect observed in the Earth's atmosphere. We suggest that the gas finds its way to the sites of star formation only after being forced out of the halo by the strong interaction (e.g., galactic fountain) at the disc-halo interface.