CAASTRO 3RD ANNUAL RETREAT AGENDA

Peppers, The Sands Resort, Torquay, Victoria

ABSTRACTS

Day 1 – Wednesday 20 November 2013

Professor Philip Podsiadlowski, University of Oxford

The Fates of Massive Stars and the Origin of Neutron Star/Black Hole Masses and Kicks

I will review the recent progress on understanding the final fate of massive stars, and the different mechanisms of forming neutron stars (iron core collapse and electron-capture) and black holes (prompt or fallback) and the implications for their post-supernova masses and kicks. I will show how this depends on whether the star evolves as a single object or in a close binary and discuss its implications for the formation of compact X-ray binaries and relativistic pulsar binaries. I will also discuss observational constraints (from Be X-ray binaries and relativistic pulsars) that may help to constrain the supernova physics.

Day 2 – Thursday 21 November 2013

Dr Michael Childress (Dark), Australian National University

Ages of Type Ia Supernovae Along the Galaxy Mass Sequence

The age distribution of Type Ia supernovae (SNe Ia) in a given galaxy is the convolution of the SN Ia delay time distribution (DTD) and the galaxy's star-formation history (SFH). Galaxy SFHs have a strong dependence on the galaxy's stellar mass, such that more massive galaxies (log(M) ~ 11) formed most of their stars in the distant past (t ~ 5-10 Gyr) while low mass galaxies (log(M) ~ 8) formed most of their stars recently (t ~ 10-100 Myr). The mass-dependent SFH of galaxies couples to the SN Ia DTD to yield an evolution of the mean ages of SNe Ia along the galaxy mass sequence. For galaxies still actively forming stars, the fading of the cosmic star-formation rate is shallower than a 1/t SN Ia DTD, so mean SN Ia ages peak at the DTD peak in actively star-forming galaxies. For galaxies which have ceased star formation in some quenching process, the SN Ia age peaks at the quenching epoch, which shows a steep transition in galaxy mass similar to that observed in SN Ia Hubble residual trends.

Mr Tao Hong (Dark), University of Western Australia

2MASS Tully-Fisher Survey

As a precursor to the Wallaby Tully-Fisher (TF) survey, the 2MASS Tully-Fisher Survey (2MTF) aims to measure Tully-Fisher distances for all bright inclined spirals in the 2MASS Redshift Survey (2MRS) using high-quality HI widths and 2MASS photometry. Compared with previous peculiar velocity surveys, 2MTF provides more accurate width measurements and more uniform sky coverage. HI observations were obtained from the GBT, Arecibo and Parkes telescopes. With these new redshift-independent distances, we will significantly improve the understanding of the mass distribution of the local Universe. In this talk, I will briefly review the 2MTF observations and the estimations of Tully-Fisher distances, introduce the methods which we used to analyze the 2MTF peculiar velocity field, and present our measurements of the bulk flow, as well as some simple constraints on cosmological parameters.

Dr Signe Riemer-Sorensen (Dark), University of Oslo, Norway

Dark radiation results from Planck and WiggleZ

The neutrinos provide one of the greatest puzzles for modern particle physics with their mass unmeasured from laboratory experiments and room for more than three species. Both quantities can be derived from cosmological measurements of the cosmic microwave background and large scale structure. I will present the newest results from a combined analysis of Planck and WiggleZ data.

Dr Katherine Mack (Dark), University of Melbourne

Known Unknowns of Dark Matter Annihilation over Cosmic Time

Dark matter annihilation has the potential to have observable effects on baryonic structure formation by injecting energy into surrounding gas. I will discuss unknowns in the abundance and structure of dark matter halos and how these uncertainties affect predictions of dark matter annihilation power over cosmic time.

Dr Eyal Kazin (Dark), Swinburne University of Technology

Improved distance measurements with reconstructed WiggleZ

The baryonic acoustic oscillations in galaxy maps has been shown to be a central tool in constraining cosmology. However, due to the growth of structure, this 150 Mpc feature in the two-point correlation function becomes slightly blurred causing a degradation of its distance constraining power. In this talk I present the reconstruction technique which sharpens this standard ruler by restoring information encoded in the matter density field. We have recently applied this technique on the galaxy maps of the WiggleZ Dark Energy Survey ($0.2< z< 1$), and find the technique successful, significantly improving distance measurements.

Dr David Parkinson (Dark), University of Queensland

Redshift-space distortions and Galileon gravity

The motions of galaxies on cosmological scales can be used to test theories of gravity. These motions (peculiar velocities) are imprinted as distortions in the redshift-space galaxy power spectrum. We use measurements of the multiple power spectrum from the WiggleZ Dark Energy Survey to test for the existence of Galileon scalar fields. These Galileons are generically predicted in modified gravity theories such as Massive Gravity, and generate fifth-force effects that have characteristic observational signatures the matter power spectra. I will present the current constraints on such theories, and how future large-scale surveys will be able to test/falsify such models.

Dr Chris Lidman (Dark), AAO

OzDES - Spectroscopic follow-up of the Dark Energy Survey with the AAT

OzDES has been awarded 100 nights of time with the AAT over the next five years to observe targets in the 10 deep fields of the Dark Energy Survey (DES). Specific examples of the kinds of projects OzDES will pursue include obtaining the redshifts for thousands of Type Ia supernova host galaxies to help constrain the dark energy equation of state parameter, and monitoring 500 AGN to measure the growth of black holes over the last 12 billion years. DES started operations at the end of August 2013 and two runs with the AAT have already occurred. In this talk, I will provide an introduction to OzDES, describe its main scientific aims and present results from the first two runs observing runs.

Dr Alan Duffy (Evolving, Dynamic)

Economics of the First Galaxies

For all their complexity the main properties of galaxies appear to obey simple scaling relations; indeed they often referred to as 'factories for star formation', an analogy particularly fitting at high redshifts. Taking this analogy further, and utilising high resolution hydrodynamic simulations of early galaxies we find that a basic 'economics' model can well describe the observed properties.

Dr Claudia Lagos (Evolving), ESO Garching

Which galaxies contribute the most to the neutral gas content of the Universe?

We study the contribution from galaxies with different properties to the global densities of star formation rate, atomic and molecular hydrogen as a function of redshift with the aim of providing guidelines for future neutral gas galaxy surveys. We use the galaxy formation model GALFORM in the LCDM framework. This model includes a self-consistent calculation of the relation between the star formation rate, molecular, H2, and atomic, HI, gas contents. Our model predicts that at z< 1, 70% of the H2 in the universe is locked up in galaxies with star formation rates in the range 1-10 Msun/yr. Galaxies with moderately large star formation rates, SFR> 10 Msun/yr, have a contribution increasing with redshift and reaching 40% at z~2. Current high-redshift galaxy surveys are limited to detect carbon monoxide in galaxies with SFR> 100 Msun/yr, which in our model make up only 3% of the H2 in the universe at z~2, and reach their maximum contribution at z~3.7, with 6%. This contrasts with the HI cosmic density, which is always dominated by galaxies with star formation rates < 1 Msun/yr. In terms of stellar mass, the H2 density is dominated by massive galaxies, Mstellar> 10^10 Msun, at any time, highly contrasting with the HI density, which is dominated by low mass galaxies, Mstellar< 10^9 Msun. We discuss the physics behind these trends and the findings in the context of future neutral gas galaxy surveys.

Prof Carlton Baugh (Invited Speaker), Durham University

What can we believe from galaxy formation models?

The formation and evolution of galaxies is driven by many complex, nonlinear processes, such as star formation and heating by supernovae and AGN. I will describe recent attempts to model the interplay between these processes and address the robustness of the model predictions. I will also give an overview of recent extensions of the models to look in more detail at the content of the interstellar medium which has opened up the capability to make predictions for ASKAP and the SKA.

Day 3 – Friday 22 November 2013

Professor Marc Davis (Invited Speaker), UC Berkeley

Large Scale Structure – Cosmic Flows

20 years ago, Cosmic Flows was an active research field that abruptly ended when two methods of analysis did not agree on conclusions. Since that time the data, with enormous input from Australian astronomers, has recently improved, justifying another look. The velocity field generated by the galaxy distribution out to 12,000 km/s explains our dipole velocity of 640 km/s and the peculiar velocity of all nearby galaxies. This talk will be instructive for the younger students who are not familiar with 20 years of research, and for the other old-timers, it is quite beautiful to see how well linear theory fits the observed velocity field.

Dr Evan Keane (Dynamic), Swinburne University of Technology

Detecting highly-dispersed bursts with next-generation radio telescopes

The recent discovery of 10 or so Fast Radio Bursts (FRBs) has been a pleasant surprise. The FRB progenitors are highly-energetic, cosmological in origin and not easily explained as any currently known source. To truly understand the origin of these bursts, and address questions as to their usefulness as cosmological probes, we need to find more, to elucidate their luminosity and redshift distributions, and to observationally characterise them better, i.e. improving positional localisation, measuring polarisation properties and issuing rapid alerts for multi-wavelength follow ups. Here I present estimates for the discovery rate of FRBs for a number of current and next-generation radio telescopes operating at different sky frequencies and in different modes, i.e. pulsar-type and imaging-type observations. A number of telescopes will be able to combine impressive sensitivities, manageable practical difficulties (wrt scattering and dispersion smearing) with a high Tobs* FOV product so that FRB discoveries should become numerous. I will also briefly discuss different search methodologies for fully exploiting the data from these telescopes.

Ms Manisha Caleb (Dynamic), Australian National University

Searching for the Intergalactic Magnetic Field

Faraday rotation of linearly polarized light from extragalactic sources and pulsars is a particularly powerful probe of the diffuse Galactic Magnetic Field. Major surveys of pulsar Rotation Measures (RMs) have been conducted over the last couple of decades and nearly a third of the known pulsars have documented RM values. There has been a lot of progress since the 1980s when the magnetic field in the local area of our Galaxy was first traced by a very small sample of local pulsars. The dispersion measure when combined with the RM provides a direct method of estimating the average value of the component of the Magnetic Field along our line of sight weighted by the local electron density. The large-scale field structure in the Galactic disk has been most efficiently deduced this way. The first use of available pulsar polarization data to map the Galactic Magnetic Field, led to unequivocal evidence for a clockwise-directed local field, as viewed from the Galactic north. It also showed that the large-scale magnetic fields go along the spiral arms and that the field directions reverse from arm to arm. The magnetic field of the Galactic halo, mainly revealed by the sky distribution of rotation measures of extragalactic radio sources, suggests a global structure of a twisted dipolar field.

A new population of bright transients of unknown origin (termed Fast Radio Bursts or FRBs) represents the first detections of coherent radio emission for compact sources outside the Local Group. The current theorized rate of FRB occurrences is 104 sky-1day-1 at 1400 MHz, and given the FOV and other specifications of Parkes, it should be able to detect an FRB every 10 days. In this talk I will introduce new instrumentation that may allow us to make the first measurement of the intergalactic magnetic field strength and will be validated by observing pulsars and Rotating Radio Transients (the RRATs).

Mr Samuel Oronsaye (Dynamic), Curtin University

Searching for FRBs with the Murchison Widefield Array (MWA)

This presentation reports the results of a test search for Fast Radio Bursts (FRBs), short duration transients believed to be a result of violent phenomena at cosmological distances with the Murchison Widefield Array (MWA). Trott, Tingay Wayth (2013) have estimated the expected detection rate of FRBs with the MWA, under certain assumptions. In this report, we present the results of the test observations with the MWA and a preliminary comparison with the expectations of Trott, Tingay and Wayth (2013)

Dr Ewan Barr (Dynamic), Swinburne University of Technology

Accelerated acceleration searching and the GPU revolutnion

In high time-resolution radio astronomy the speed at which we can analyse observed data is often a limiting factor in the pursuit of new science. This is particularly true in case of the search for new millisecond pulsars (MSP) in binary systems. The discovery of these systems -- notable for their uses as unparalleled natural laboratories for tests of gravitation, elements in a Galaxy spanning gravitational-wave-detecting interferometer and tracers of stellar binary evolution -- is notoriously difficult due to the fact that we must search for them not only in position, dispersion measure and spin frequency space, but also in acceleration (or orbital template) space. In the past this has been a prohibitively resource-intensive exercise, requiring vast amounts of time on large computing clusters. However, the advent of cheap and useable graphics processing units (GPUs) has allowed for a giant leap in processing capability. The use of GPUs has allowed us to not only vastly increase the parameter space in which we search for binary pulsars, but also develop real-time searching software for both pulsars and other fast transients such as fast radio bursts (FRBs) and rotating radio transients (RRaTs). In this talk I will present the latest developments in GPU-based pulsar/transient searching from Swinburne and look at the application of these systems to past, current and future data sets.

Ms Emily Petroff (Dynamic), Swinburne University of Technology

Searching for Fast Radio Bursts at intermediate latitudes

The High Time Resolution Universe (HTRU) Survey is an ongoing project at the Parkes Radio Telescope studying the radio sky at 64μs resolution. Analysis of only a fraction of the survey at high latitudes has yielded a population of Fast Radio Bursts (FRBs) thought to lie at extragalactic distances. These bright pulses appear to be non-repeating and are likely cataclysmic in nature; all bursts are highly dispersed with DMs ranging from 550 - 1103 cm^{-3}pc. Based on these detections, the overall rate of FRBs has been estimated at 10,000 per sky per day! I have searched a second section of the HTRU data set - medium latitude pointings at |b| < 15 degrees - for FRB events. If initial rate estimates are correct we might expect between 3 and 10 events to exist in the entire medium latitude portion of the survey. No such events have been found in my analysis. The non-detection of FRB events at medium latitudes gives backing to an astronomical origin, as RFI events would be expected isotropically throughout the survey, and suggests that Galactic effects must be more closely considered and modifications to our predicted rate may need to be made.

Dr Richard Scalzo (Dark, Dynamic), Australian National University

Status of the SkyMapper Supernova Search

After an extensive commissioning period, the SkyMapper telescope is finally taking observations in its Science Verification period. I will give a brief update on the supernova search, including the subtraction pipeline for discovering supernovae and other optical transients, and ongoing supernova search operations, including any first results.

Dr Christian Wolf (Evolving, Dark), Australian National University

SkyMapper update & science

I will (i) present an update on preparations for the SkyMapper Survey and expected data quality, (ii) outline plans for a public database with detailed object classification and redshift estimation from template-fitting and new bias-free, empirical KDE methods, and (iii) highlight a science project to survey maps of star formation changes in nearby galaxies.

Dr Emma Ryan-Weber (Evolving), Swinburne University of Technology

Metals, galaxies and escaping flux at the end of reionization

The details surround the end of the dark ages are among the final unknowns in modern astronomy. We have yet to discover when the starlight from the firs galaxies lit up the Universe, ionizing the surrounding neutral hydrogen gas. I will talk about our search for intergalactic metals at the highest observable redshifts. The detection of metals in the intergalactic medium provides a completely independent measure of the number of Lyman continuum photons in early Universe available to reionize cosmic hydrogen. I will present new results on the evolution of the cosmological mass density of triply ionized Carbon, Omega (CIV), from redshifts 4.2 to 6.2. In addition I will present work on the relationship between CIV absorbers and their galaxy environments and discuss a novel solution to observational problem of the lack of ionizing flux escaping from high redshift galaxies.

Mr Antonios Katsianis (Evolving), University of Melbourne

Properties of high redshift galaxies

We investigate the evolution of the Star Formation Rate Function (SFRF), star formation rateâˆ'stellar mass relation (SFRâˆ'Mâ‹†) and Galaxy Stellar Mass Function (GSMF) of z 4 âˆ' 7 galaxies, using cosmological Smoothed Particle Hydrodynamic (SPH) simulations run with the code P-GADGET3(XXL). We explore the effects of different feedback prescriptions (galactic winds and AGN feedback), initial stellar mass functions and metal cooling. We show that a fiducial model, with strong winds and early AGN feedback, is able to reproduce the observed SFRF at redshift $4 < z < 7$ and the stellar mass function obtained from UV-selected samples of galaxies at redshift $6 < z < 7$. At $z \sim 4$ our simulations are more consistent with recent results from IR-selected samples. Despite this success there is a tension between the observed and simulated SFRâˆ'Mâ‹† relations.

Dr Emil Lenc (Evolving), University of Sydney

Polarisation with the Murchison Widefield Array

With the Murchison Widefield Array now well into operations, a great deal of experience has been accumulated with respect to the capabilities of the instrument. Here I will present an overview of long-wavelength polarimetry with the MWA together with recent results obtained during commissioning and early operations that demonstrate its polarimetric capabilities.

Dr Se-Heon Oh (Evolving), University of Western Australia

WALLABY/DINGO kinematic pipeline: a new Bayesian MCMC tilted-ring fitter

The WALLABY kinematics working group has defined a detailed strategy to parameterise the kinematics of spatially resolved disk-donomited 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. In this talk, I will present a new Bayesian MCMC tilted-ring fitting program which implements 2D tilted-ring fits to velocity fields, and discuss its performance test using a set of sample galaxies from nearby galaxy surveys (e.g., LVHIS, LITTLE THINGS) as well as WALLABY-like model galaxies.

Dr James Allison (Evolving), University of Sydney

HI absorption in HIPASS and implications for future surveys

Absorption of 21cm wavelength radiation by atomic hydrogen (HI) equips the observer with a powerful tool to map the line-of-sight kinematics of neutral gas in galaxies towards background radio sources. Observations of the 21cm absorption-line have revealed highly broadened and doppler-shifted lines associated with radio-loud active galactic nuclei (AGNs). Such studies have provided direct evidence of the presence of neutral gas in-fall and out-flows, indicating that interaction between the AGN with the interstellar medium is common.

Using a method based on Bayesian model comparison, developed for future all-sky absorption surveys with the Square Kilometre Array (SKAP) precursor telescopes, we have searched for cold HI gas in over 200 nearby radio galaxies in the first-generation HI Parkes All-sky Survey (HIPASS). I will present results from this search and follow-up observations with the Australia Telescope Compact Array (ATCA). Furthermore I will discuss the implications for future discovery with early science from an absorption-line survey using Australian SKA Pathfinder.

Mr Scott Meyer (Evolving, Dark), University of Western Australia

HI Stacking and the Tully-Fisher Relation

I will present an investigation of the Tully-Fisher relation constructed by stacking neutral hydrogen (HI) profile widths. We expect to find a correlation between the width of a stacked HI profile and the maximum rotational velocity of the galaxies used in the stack. We propose that this correlation could be used to construct a Tully-Fisher relation from a set of stacked profiles that mimics the Tully-Fisher relation produced by the input galaxies. We have investigated analytical galaxies, simulated galaxies and the HIPASS data set. We find that there is a possibility that HI stacked profiles can be used in place of individual profiles for use in the Tully-Fisher relation.

Ms Eromanga Adermann (Evolving, Dynamic), University of Sydney

Ultra-Luminous X-Ray Sources: Extreme X-ray Binaries or Intermediate Mass Black Holes?

Ultra-Luminous X-ray Sources (ULXs) are extra-galactic, non-nuclear X-ray point sources with X-ray luminosities greater than the theoretical maximum X-ray luminosity for an accreting 10 Solar mass black hole. As such, they have been interpreted as either evidence of extreme accretion rates onto stellar mass black holes (M < 100 solar masses), or evidence of intermediate mass black holes (M ~ 1E2 - 1E5 Solar masses), with masses much higher than stellar mass black holes, but less than the supermassive black holes (M ~ 1E5 - 1E10 solar masses) found in the centres of large galaxies. If ULXs are signs of extreme accretion, they may shed light on how supermassive black holes grew rapidly in the early Universe. Alternatively, if ULXs represent accretion onto black holes of intermediate mass, their study may probe the missing link between stellar mass black holes and supermassive black holes. Here I will present the results of my honours project in which I compiled a catalogue of ULXs using a supervised machine learning source classification algorithm, which I subsequently used to undertake a population study of the ULX sample.

Prof Matthew Colless (Evolving, Dark), Australian National University

Structure, motions and cosmology from the TAIPAN survey

The planned TAIPAN survey will use the UK Schmidt Telescope to map the redshifts and motions for a massive sample of galaxies covering a large volume of the nearby universe. TAIPAN will yield the definitive map of the local large-scale structure, increase the number of galaxies with known peculiar velocities by at least a factor of 5, give a model-independent measurement of the Hubble constant with 1% precision, and provide strong complementary constraints on key cosmological quantities such as the velocity power spectrum and the correlation between galaxies and dark matter.

Dr Jun Koda (Dark), Swinburne University of Technology

Large number of fast cosmological simulations

We generate 3600 mock galaxy catalogues for the WiggleZ Dark Energy Survey to calibrate the Baron Acoustic Oscillation (BAO) reconstruction technique, and measure the covariance matrix for various data analysis. In order to perform such large number of simulations, we use the COmoving Lagrangian Acceleration (COLA) method, which can simulate cosmological large-scale structure reasonably well with only 10 time steps. Our simulation is about 100 times faster than conventional N-body simulation; one COLA simulation with 1296^3 particles takes only 15 minutes with 216 computing cores, or 60 CPU core hours. We show the accuracy of our simulation by comparing with the standard N-body simulation with Gadget2.

Dr Fang Yuan (Dynamic), Australian National University

SN 2013ej, the second Type IIP supernova in M74

Type IIP supernova is the most common type of core-collapse supernova and believed to be from the least massive stars that undergo gravitational collapse at the end of their lives. The abundance of Type IIP means that they are found in the nearby universe where the progenitor stars can be directly observed. Such detections have provided the tightest constraints on their progenitor properties. Since a supernova marks the end point of stellar evolution, these studies have also advanced our understanding of massive stars. SN 2013ej is the second Type IIP to go off in galaxy M74 in the last ten years. Its proximity (~ 9 Mpc) allows us to study the progenitor star and monitor the explosion closely. Another relatively well-observed Type IIP in the same galaxy provides an opportunity for a distance-free comparison that may shed light on the correlation between supernova radiation and progenitor properties.

Ms Jessica Bloom (Evolving, Dark), University of Sydney

The SAMI Galaxy Survey: Applying Kinemetry to SAMI Pilot Galaxies

The Sydney-AAO Multi-IFS (SAMI) is a wide-field system at the Anglo-Australian Telescope (AAT), which combines the advantages of a multi-object spectrograph and those of an integral field spectrograph. The instrument has 13 deployable IFUs. The SAMI Galaxy Survey began in March 2013, and will consist of 3,000 galaxies, across a range of environments, with spatially-resolved spectroscopy. The SAMI Pilot Survey was the precursor to the full survey. It consists of 106 cluster galaxies in three distinct clusters. One of the primary goals of the Pilot Survey was to study the dynamics of galaxies in cluster environments. Kinemetry (Krajnovic et al., 2007) has proven to be an effective means of identifying and classifying disturbances and asymmetries in the kinematics of galaxies. We are developing kinemetry-based diagnostic tools that will eventually be applied to the full SAMI sample. For now, however, we are focusing on the stellar kinematics of early-type galaxies (ETGs) in the Pilot sample. This allows for the tools to be tested on a confined data set, whilst also allowing us to assess the impact of environment on kinematic asymmetries. Here, we demonstrate the progress that has been made towards the development of these tools into a comprehensive classification system, and demonstrate that kinemetry is suitable for application to SAMI galaxies. We present three criteria for determining disturbance: deviation from standard rotational motion as a function of radius; reconstructed kinematic maps for each moment of the velocity and velocity rotation fields; and a calculated 'average asymmetry term'. We will also present some sample galaxies that illustrate the application of these techniques.

Mr Joseph Callingham (Evolving), University of Sydney

A Low Radio Frequency Study of CSS and GPS Sources

Compact Steep Spectrum (CSS) and Gigahertz-Peaked Spectrum (GPS) radio sources are characterised by a small spatial extent (~few kpc) and steep radio spectra which peak at ~150 MHz for CSS sources and ~1 GHz for GPS sources. There is a general consensus in the field that these objects represent the first stage of radio galaxy evolution from hot spot motion and synchrotron ageing models. However, there have been recent VLBI results that suggest some of these CSS sources are in fact not young radio galaxies but are confined to small spatial scales due to an ambient medium restricting the scale of jets. CSS and GPS sources have not been studied in any great detail at low radio frequencies. For CSS sources, this is the frequency range in which the radio spectrum turns over - allowing a possible differentiation between the 'young' and 'frustrated' models. In this talk I will present the results from my low frequency southern archival work on CSS and GPS sources, and the outline the future direction of my PhD through the study of these sources using the Murchison Widefield Array (MWA). The MWA is perfectly suited to help with elucidating the true nature of these sources due to its all-sky survey at five different frequencies between 80 to 215 MHz. This survey will contain thousands of CSS and GPS sources with unparalleled spectral coverage at and below the turnover, providing a possible data set to conclude whether these sources represent young or frustrated radio galaxies.

Mr Antonios Katsianis (Evolving), University of Melbourne

Properties of high redshift galaxies

We study the evolution of the Star Formation Rate Function (SFRF) and Galaxy Stellar Mass Function (GSMF) of z ~ 4-7 galaxies using cosmological hydrodynamic simulations. We investigate the effect of different feedback recipes, metal cooling and Initial Mass Functions (IMFs). In our simulations both galactic winds and AGN feedback act simultaneously in a complex interplay. We show that our fiducial model, with "strong"• winds and "early"• AGN feedback, is able to reproduce the observed SFRFs and GSMFs at these high redshifts. However, we find that there is a tension between the observed and simulated star formation rate-stellar mass relation (SFR-M*). We argue that, in some cases, this tension leads to an inconsistency between the observed and simulated GSMF.

Mr Jack Line (Evolving), University of Melbourne

Time Averaging and Decorrelation of MWA Visibilities

Time averaging interferometric data has the advantage of reducing the computational load when calibrating and imaging, however it inherently causes decorrelation in the visibilities. The Real-Time System is a calibrating and imaging pipeline designed to reduce data from the MWA. Two effects of decorrelation are observed, and their impact on the RTS pipeline are explored. In particular, it is noted that the MWA correlator does not phase track and so brings it's own implications to the level of decorrelation.

Ms Aina Musaeva (Evolving), University of Sydney

Intermediate Mass Black Holes in Dwarf Galaxies

Supermassive black holes (SMBHs) are the central engines of active galactic nuclei (AGN) and are thought to lie at the heart of every large galaxy, including our own Milky Way. It is currently uncertain, however, whether AGN exist in dwarf, low mass galaxies, and if they do, whether they are powered by intermediate mass black holes (IMBHs) - a missing population of black holes with masses between 100 and 1,000 000 solar masses. The aim of my project is to search for IMBHs in dwarf galaxies and study the relationships between the mass of these black holes and the properties of their host galaxies. In order to do so, I will use dwarf galaxy samples and the second and the third XMM-Newton (2XMMi-DR3 and 3XMM) serendipitous X-ray catalogue and Chandra Source Catalogue (CSC). The major science questions I hope to answer are: (i) how common are the IMBHs in the low mass galaxies, and (ii) are the correlations between the mass of these black holes and the properties of their hosts are the same in the low mass systems compared to the high mass ones.

This poster presents the initial findings of my project, in particular: (i) the dwarf galaxy sample selection along with the highlights of the promising IMBH candidates, and (i) the HI study of the environment of one of the strongest IMBH candidates (HLX-1).

Ms Sarah Reeves (Evolving)

A search for intervening HI absorption in nearby, gas-rich galaxies

The 21cm HI absorption-line provides an ideal probe the neutral gas in galaxies well beyond the local universe (z> 0.3). However, to derive galaxy properties from absorption-line data alone, we need to better understand the conditions which lead to absorption-line detections, and how this is related to the HI distribution. To address this, we have conducted ATCA HI observations of a sample of nearby, gas-rich galaxies. By targeting low-redshift galaxies we obtain simultaneous HI absorption- and emission-line data, which allows us to directly relate HI distribution to absorption-line detection rate. In our sample we have detected at least one HI absorption-line, and we use the HI emission-line data to help understand the non-detections. In this talk I will present our results to date, and discuss implications for future absorption-line surveys.

Mr Adam Schaefer (Evolving), University of Sydney

The SAMI Galaxy Survey: Spatially Resolved Star Formation as a Function of Environment

One of the most interesting unanswered questions in the field of galaxy evolution is what role does the environment of a galaxy play in quenching star formation. The next generation of Integral Field Spectrographic surveys will allow us to measure spatially resolved star formation within galaxies and determine how this changes as a function of environment density. In this poster we use H-alpha measurements from the Sydney-AAO Multi-object Integral Field Spectrograph (SAMI) to quantify the spatial distribution of star formation in 71 galaxies. This is the largest of such studies that has been made to date. For each galaxy, drawn primarily from the GAMA regions, we use the H-beta line to determine dust extinction using the Balmer decrement. With this information we then compute the total integrated star formation rate and the radial star formation profile for each galaxy from the corrected H-alpha luminosity. These quantities are then compared to the fifth nearest neighbour density. We observe a weak correlation between the integrated star formation rate and environment density. We also see little dependence of the radial structure of star formation on the environment in agreement with previous studies (Brough et al. 2013).