ATNF
Student Symposium 2004

9:25am	**Welcome**	
9:30am	**First Session**	Chair: Brad Warren
9:30am	Rachel Deacon	OH Maser Observations of the Precursors to Planetary Nebulae
9:50am	Katherine Newton-McGee	Implications of the Far-Infrared-Radio Contiuum Correlation
10:10am	Tracey Hill	Millimetre Continuum Observations of Massive Star-formation Regions
10:30am	Ilana Klamer	Jet induced star formation at redshift 4.7
10:50am	Steven Longmore	The effect of the molecular core environment on the Initial Mass Function
11:00am	**Coffee**	
11:30am	**Second Session**	Chair: Rachel Deacon
11:30am	Jamie Stevens	Observable Properties of HIPASS Groups
11:50am	Brad Warren	ESO215-G?009: An Extreme HI-Rich Dwarf Irregular Galaxy
12:10pm	Vicki Safouris	The Giant Radio Galaxy 1545-321
12:30pm	Antoine Bouchard	Dwarf galaxies in the Centaurus A group
12:50pm	**Lunch**	

13:50pm	**Third Session**	Chair: Ilana Klamer
13:50pm	Daniel Mitchell	An overview of interference mitigation in radio astronomy
14:10pm	Martin Leung	Line feed design for MOST
14:30pm	Nasiha Nikolic	Scattering by a Luneberg Lens partially covered by a metallic cap
14:50pm	Deanna Matthews	Spillover Correction for the Galactic All Sky Survey
15:00pm	Leith Godfrey	Multi Wavelength Study of Quasar Jets
15:10pm	**Close**	

Abstracts

Rachel Deacon, University of Sydney

OH Maser Observations of the Precursors to Planetary Nebulae

Post-asymptotic giant branch (post-AGB) stars are a short-lived precursor to planetary nebulae, the remnants of light to medium mass stars. A large percentage of planetary nebulae are found to have non-spherical morphologies which are not explained. A sample of 86 post-AGB stars has been studied at several 18 cm transitions of the OH molecule, generated by maser effects in their circumstellar envelopes, in order to find clues to the origins of PN morphologies. Results show that 25% of sources in the sample are likely to have asymmetric or bipolar outflows. There is a trend with some sources likely to evolve from having spherical, to irregular, to fully bipolar outflows. We have also noticed that source profiles at one transition (1667 MHz) are nearly always broader than 1612 MHz profiles. This 'mainline overshoot' phenomenon has been previously noted and may indicate that 1667 MHz masers often extend further from the stellar core than 1612 MHz masers in post-AGB stars.

Katherine Newton-McGee, University of Sydney

Implications of the Far-Infrared-Radio Contiuum Correlation

I will be presenting an overview of my PhD topic. In particular I will be focusing on the specific areas I wish to investigate throughout my PhD and finally present some of the preliminary work I have done on the comparison of various data sets of the galactic plane

Tracey Hill, University of New South Wales

Millimetre Continuum Observations of Massive Star-formation Regions

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Ilana Klamer, University of Sydney

Jet induced star formation at redshift 4.7

The z=4.7 quasar BR 1202–0725 is a well studied source thought to comprise an AGN and an M82-like starburst companion. A search through the Chandra archives has revealed previously unpublished observations of this quasar. We have reduced this data and found evidence for very large luminosities of hard X-ray emission emanating from both the companion and the quasar with the hint of an extension between the two. As a consequence of this new finding the above interpretation of the BR 1202–0725 double is thrown into question. A far more natural interpretation for this source is that a relativistic jet emanating from the quasar nucleus is triggering star formation along the jet axis.

Steven Longmore, University of New South Wales

The effect of the molecular core environment on the Initial Mass Function

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Jamie Stevens, University of Melbourne

Observable Properties of HIPASS Groups

I will talk about how groups of galaxies have been found in the HIPASS Catalogue, and what their observable properties are, and how they change with the group's density.

Bradley Warren, Australian National University

ESO215-G?009: An Extreme HI-Rich Dwarf Irregular Galaxy

We present deep BVRI band images and HI line observations of the nearby, low surface brightness galaxy ESO215-G?009 which were obtained with the ANU 2.3-m Telescope and the Australia Telescope Compact Array, respectively. ESO215-G?009 was selected from the HIPASS Bright Galaxy Catalog because it has the second highest HI mass-to-light ratio of the galaxies with measured B band apparent magnitudes. We find that it is an isolated dwarf irregular galaxy with an old stellar population. We place an upper limit on the current star formation rate of $\sim 2.5\times10^{-3}M_{\odot}$/yr. The extended HI disk shows regular rotation (v_{rot} = 51 +/- 8 km/s), and at a column density of $\sim 5.0 \times 10^{19}$ atoms/cm^2 can be traced out to over six times the Holmberg radius of the stellar component (radius at μ_B = 26.6 mag/arcsec^2). After foreground star subtraction, we measure a B band apparent magnitude of 16.13 +/- 0.07 mag within a radius of 80". The HI flux density is 122 +/- 4 Jy km/s within a radius of 370". Given a Galactic extinction of A_B = 0.95 +/- 0.15 mag, we derive an HI mass-to-light ratio of 22 +/- 4 $M_{\odot}/L_{\odot}$ for ESO215-G?009. To our knowledge this is the highest ratio for a galaxy to be confirmed by accurate measurement to date.

Vicki Safouris, Australian National University

The Giant Radio Galaxy 1545-321

1545-321 is a rare example of a giant radio galaxy in which jets from the central black hole have created Mpc-sized double radio lobes. More unusual is our discovery of a smaller pair of radio lobes that are nested within the giant radio galaxy. Such double-double structures are traditionally understood as a restarting of the jets from the central engine after a period of inactivity. I will present ATCA + VLA radio images of this radio galaxy and discuss our interpretation of the source structure in light of recent hydrodynamical simulations of restarting jets.

Antoine Bouchard, Australian National University

Dwarf galaxies in the Centaurus A group

Because the Centaurus A group of galaxies is one of the closest group visible in the southern hemisphere, it is possible to get the 3D position for all galaxies within the group as well as dynamic and kinematic information. This makes the Centaurus A group a perfect laboratory to study the environmental impact (ie the influence of other nearby galaxies) on the evolution of dwarf galaxies. I will present a strategy to perform such a study.

Daniel Mitchell, University of Sydney

An overview of interference mitigation in radio astronomy.

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Martin Leung, University of Sydney

Line feed design for MOST

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Nasiha Nikolic

Scattering by a Luneberg Lens partially covered by a metallic cap

A Luneberg lens (LL) has many applications due to its advantages: wide bandwidth, very wide field of view and capability of placing simultaneous beams that may be pointed in arbitrary directions. In most configurations there are a number of feeds placed around the lens and beam scanning can be achieved by switching between the antenna elements. Our aim is to develop an integral equation method for the analysis of a lens with a number of feeds placed on its surface or between the dielectric layers.

A LL with integrated feeds was not considered in the past, and it was not possible to compare the results of this analysis with any other measured or predicted results. At this point, we were looking for a well known structure that we could use to verify our results. One suitable structure for comparison is a LL partially covered by a metallic cap. This structure is frequently used as a radar cross section (RCS) enhancer.

The Luneberg lens partially covered by a metallic cap was analysed in the past using representation of the fields in terms of spherical harmonics and using physical optics principles, ie replacing a conducting surface by an equivalent current representation. Although, good agreement between measured and predicted results was obtained by this method, its accuracy is limited to the validity of equivalent current approximations.

We developed a new method for the calculation of RCS of a Luneberg Lens where the surface current is represented as a linear combination of modes defined for conical waveguides. The results for RCS are compared with the results obtained in CST Microwave Studio and good agreement is obtained.

Next step is to compare the results for RCS with the results of the integral equation method.

Deanna Matthews, LaTrobe University

Spillover Correction for the Galactic AllSky Survey

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Leith Godfrey, Australian National University

Multi Wavelength Study of Quasar Jets

Radio images of quasars often reveal jet structure, however optical and X-ray dtections of jets associated with quasars have been extremely rare, until the lanch of the Chandra X-ray Observatory in 1999. Chandra images have a resolution f less than 1 arcsecond, and are therefore capable of resolving structure in kp scale jets. There is ongoing debate as to how the large X-ray flux is producedRadio maps of these sources are of limited use by themselves because the observd surface brightness can be produced under a wide range of physical conditions.The addition of X-ray and optical data to compliment radio images will allow phsical conditions to be tightly constrained at different positions along the jet and therefore offer a better understanding of the physical processes that goven the jet dynamics, and radiation processes that govern what is observed. This reater understanding of jet dynamics and emission processes may in turn assist My project will involve radio observations of a sample of quasars with known X-ay jets using the Compact Array. Following this will be detailed study and modeing of sources with data from Chandra observatory, Hubble space telescope, Spit (infrared) space teluscope, ?BA and the Compact Array.