ATNF

Student Symposium 2005
Wednesday May 11

9:25am	**Welcome**	
9:30am	**First Session**	Chair: Rachel Deacon
9:30am	Deanna Matthews	The Structure of the Magellanic Stream: Pilot Survey and Results
9:50am	Katherine Newton-McGee	Depolarisation Silhouettes and Faraday Mapping
10:10am	Emil Lenc	Seeing the Bigger Picture
10:30am	Adam Deller	Software correlation for advanced VLBI, with applications in pulsar and extragalactic astrophysics
10:50am	Aaron Chippendale	The Cosmological Reionization Experiment
11:00am	**Coffee**	
11:30am	**Second Session: Pulsars**	Chair: Katherine Newton-McGee
11:30am	Aidan Hotan	High Precision Baseband observations of binary and millisecond pulsars
12:00am	Haydon Knight	Giant Pulses from the millisecond pulsar J0218+4232
12:20pm	Natasa Vranesevic	What is special about high-B pulsars?
12:50pm	**Lunch**	

13:50pm	**Third Session: Extragalactic**	Chair: TBA
13:50pm	Antoine Bouchard	HI detection of early-type dwarf galaxies in the Sculptor Group
14:10pm	Leith Godfrey	A multi-wavelength study of X-ray bright extragalactic jets
14:30pm	Vicky Safouris	Giant Radio Galaxies and the IGM
14:50pm	**Close**	

Abstracts

Deanna Matthews, LaTrobe University

The Structure of the Magellanic Stream: Pilot Survey and Results

The HI structure of the Magellanic Stream has proved useful in studying the gravitational and ram-pressure interaction of the Magellanic Clouds with the Galaxy, and for investigating the orbital history of the SMC and LMC. Previous Parkes observations reveal several tantalising features such as a residual helicity and transverse velocity gradient which might reflect the binary motion of the SMC and LMC and instabilities in fluid flow from the SMC into the stream, which might represent interaction with the hot halo gas. A 200 deg region at the head of the stream was observed in October 2003, and will again be observed in July 2004. The results obtained thus far will be discussed, as will the need for further observations.

Katherine Newton-McGee, University of Sydney

Depolarisation Silhouettes and Faraday Mapping

Magnetic fields play a major role in many important processes, sucha as turbulence and gas motions, conduction and heating in gas clouds of the interstellar medium (ISM) and in cloud collapse and star formation. There are many methods by which to study both small and large scale magnetic fields in the nearby universe, however Faraday rotation is currently the only technique that allows magentic fields of distant objects to be studied in detail. We present the plans to study the magnetic fields of distant galaxies and also examine how Faraday roation can be used to probe the magneto-ionic ISM of our own Galaxy.

Emil Lenc, Swinburne University

Seeing the bigger picture

VLBI imaging in the past, due to constraints in data storage capacity and processing time, were limited to relatively narrow fields of view. With recent technological improvements and the implementation of new imaging algorithms it is now feasible to fully utilize the high resolution capabilities of VLBI over a wide-field of view. I will briefly talk about my application of wide-field VLBI techniques to starburst galaxies and AGN jets.

Adam Deller, Swinburne University

Software correlation for advanced VLBI, with applications in pulsar and extragalactic astrophysics

Both pulsars and extragalactic supernova remnants are (even for radio astronomy) comparatively weak sources, requiring extremely sensitive interferometers to detect and image them. The software correlator will allow high data rate (up to 1 Gbps) VLBI observations to be processed, providing high sensitivity and high spectral resolution data sets for the detailed study of weak celestial radio sources and masers. In this talk, I will discuss the implementation of the software correlator, its immediate benefits and application and its role in eVLBI and SKA research.

Aaron Chippendale, ATNF

The Cosmological Reionization Experiment

First light for the ATNF Cosmological Reionization Experiment is scheduled for June this year. Our goal is to measure the VHF background sky spectrum with 1 mK accuracy. We have designed a receiver and spectrometer covering the 114-228 MHz band, corresponding to HI redshifts of 11.5-5.2. We will observe with both one and two antennas, yielding both total power and interferometric measurements of low spatial resolution. I will present the design philosophy, the observing strategy and a the current status.

Aidan Hotan, Swinburne University

High Precision Baseband observations of binary and millisecond pulsars

In August 2002, a new pulsar recording system known as CPSR2 was brought on-line at the Parkes radio telescope. This instrument utilises a technique known as "coherent dedispersion" that allows unprecedented precision in measurements of pulse arrival times and mean profile polarimetry. In this talk I describe highlights of the results obtained during the first two years of operation. These include precision timing of a supposedly unstable pulsar and the detection of a General Relativistic effect known as geodetic precession in the binary pulsar J1141-6545. I will also describe observations of the primary component of the double pulsar binary system, PSR J0737-3039A, taken in May 2004. From this data set, we obtain calibrated mean polarimetric profiles and detect the signature of General Relativistic Shapiro delay, which can be used to constrain the inclination angle of the binary system.

Haydon Knight, Swinburne University

Giant Pulses from the millisecond pulsar J0218+4232

We have conducted a search for giant pulses from three millisecond pulsars using the Greenbank telescope. PSR J0218+4232 was found to emit giant pulses of very short intrinsic durations at both 857 and 1373 MHz. Only 3 of the 151 pulses found had energies greater than 10 times the average pulse energy. The pulses coincide with the minima of the integrated emission profile and follow a power-law energy distribution. We suggest that the 'giant pulse' emission phenomenom be defined as nanosecond-timescale emissions with power-law energy distributions rather than pulses of high energy. The non-detection of emission from PSRs B1957+20 and J1843-1113 confirms that the existence of pulsed X-ray emission with a hard spectrum is a better indicator of giant pulse emissivity than high magnetic field at the light cylinder.

Natasa Vranesevic, Sydney University

What is special about high-B pulsars

The Parkes multibeam survey led to the identification of a number of long-period pulsars with magnetic field well above the "quantum critical field" of 4.4 x 10 to 13 G. Traditional pulsar emission theories postulated that radio emission is suppressed above the this critical field. The aims of this project is to understand emission properties of high-B pulsars. So in this talk I will give brief introduction to the topic with highlights to the pulsar characteristics which we plan to study in order to attain radio emission characteristic for high magnetic field pulsars

Antoine Bouchard, Australian National University

HI detection of early-type dwarf galaxies in the Sculptor Group

We present deep HI Parkes observations of 5 lowest luminosity galaxies of the Sculptor Group. These high spectral resolution observations are significantly deeper than any previous detection attempts. Of the 5 targets, 4 were detected, leaving a single Sculptor group galaxy, Scl-dE1, without any HI detections ($M_{HI}/L_B < 0.01$). ATCA archived data shows significant offsets between the HI and optical components

Leith Godfrey, Australian National University

A Multi-wavelength study of X-ray bright Extragalactic Jets

Observations with the Chandra X-ray Observatory have recently shown that quasars and radio galaxies often exhibit bright X-ray emission from the associated jets. As part of my thesis I will be investigating the relationship between the radio and X-ray emission from a sample of quasars with prominent X-ray jets.
In this talk I will share some initial results from our ATCA 12mm imaging performed last year. I will also discuss the upcoming ATCA and LBA observations of a particularly unusual quasar jet (PKS 1421-490) that will help to reveal the nature of this source.

Vicky Safouris, Australian National University

Giant radio galaxies and the IGM

I will present new ATCA mosaic observations of the extended structure of the giant radio galaxy 0319-454 where we believe local gradients in the IGM are responsible for the unusual appearance of the radio lobes. Galaxy redshifts in the vicinity of the giant radio source have been measured with the 2dF instrument on the AAT and show that the host galaxy is located at the edge of a filament in the galaxy distribution with the radio axis parallel to the filament. I will briefly discuss future plans for modeling the physical interaction between the light synchrotron plasma and diffuse warm-hot gas associated with the galaxy filament.