Talk Abstracts

Effects of Baryon Removal on the Structure of Dwarf Spheroidals

Kenza Arraki, Anatoy A. Klypin (NMSU), Surhud More (University of Chicago)

Dwarf spheroidals (dSphs) are extremely gas poor, dark matter-dominated galaxies, which make them ideal laboratories to test the predictions of the concordance cold dark matter (CDM) model. We argue that the removal of a small baryonic component from central regions of forming dwarf spheroidal galaxies may substantially reduce their central dark matter density. To do this, we perform controlled,numerical simulations, which mimic the effects of baryons. Thus, it may play an important role in alleviating one of the problems of CDM model related with the structure of relatively massive satellite galaxies of the Milky Way.

Near-Earth Asteroid Pole Directions from Radar Speckle Tracking

Michael W. Busch, Walter F. Brisken (NRAO), Lance A. M. Benner (JPL), Michael C. Nolan (Arecibo Observatory)

The trajectories, shapes, and pole directions of near-Earth asteroids (NEAs) are coupled to each other by radiation pressure (the Yarkovsky and YORP effects). Knowing NEAs pole directions is essential for planning spacecraft missions, for predicting potential Earth impacts, and for understanding the history of the NEA population. We have developed the technique of radar speckle tracking to measure asteroid poles using the Arecibo and Goldstone planetary radars and elements of the VLBA and EVLA. I will present recent speckle tracking results, focusing on current and potential spacecraft mission targets and on the distribution of NEA pole directions.

Update on the Magdalena Ridge Observatory Interferometer

M. Creech-Eakman, V. Romero (NMT/MRO), I. Payne, R. Selina, (MRO), C. Haniff, D. Buscher, J. Young (Cambridge), and MRO staff and Students

I will present an overview of the MRO Interferometer, a brief look at the science case for the instruments, and plans forward toward attaining first fringes in 2015.

Is M82 the same as Cen A?

Jean Eilek, Josh Marvil (NMT/NRAO), Susan Neff (GSFC), Frazer Owen (NRAO)

At first glance M82 and NGC5128 seem to be very different beasts. M82 is a small disk galaxy with a strong starburst; NGC5128 is a large elliptical whose active nucleus has created the famous radio galaxy, Cen A. On closer inspection, however, surprising similarities emerge. JVLA observations of M82 reveal new a wealth of new structures in its starburst core. GALEX FUV observations show that the gas/dust disk in NGC5128 hosts a strong starburst of comparable strength to that in M82. Both starbursts must be driving out strong winds. The wind in M82 is well known; we discuss how the wind in CenA makes its presence felt.

Projects at NMSU Working with APOGEE

Diane Feuillet, Jon Holtzman, Michael Hayden (NMSU)

Several projects in connection to the SDSS III APOGEE survey are in progress at NMSU. We are observing select, bright APOGEE science stars with the ARC Echelle spectrograph on the APO 3.5 m telescope as optical calibration, and to provide abundances of additional elements. We are also beginning a survey of nearby stars with the NMSU 1 m at APO and the APOGEE spectrograph.

Formation of super star cluster by triggering

Yasuo Fukui (Nagoya University0

An Update of the Megamaser Cosmology Project

Feng Gao (NRAO)

The Megamaser Cosmology Project (MCP) is aimed to determine the Hubble Constant to within 3% errors, by measuring the geometric distance to several nearby galaxies which harbor water megamasers. From the Keplerian rotation movements of the maser spots we can also derive a precise central black hole mass, with 20% uncertainty. Recently we have finished the distance measurement of UGC3789 and NGC6264, and together we get H0=68.0+/- 4.8 km/s/Mpc so far. Besides that, the black hole mass of 5 new galaxies have been measured and with GBT we've discovered 3 more excellent candidates for the distance measurement. I'll give an update on the project from each aspect.

Tearing the Veil-EVLA Observations of the HI Environment of the Orion Nebula

Miller Goss (NRAO)

We present HI 21 cm observations of the Orion Nebula with an angular resolution of about 6 arc sec and a velocity resolution of 0.8 km/s. The data reveal HI absorption towards the radio continuum of the HII region and HI emission (for the first time) arising from the Orion Bar photon-dominated region (PDR) and from the Orion-KL outflow. Mechanical feedback on the Veil manifests itself through the interaction of ionized flow systems in the Orion Nebula, in particular the Herbig-Haro object HH 202 with the Veil. Our results reaffirm the blister model for the M42 HII region, while also revealing its relation to the neutral environment on a larger scale.

Preliminary Results from Wideband VLBA Polarimetric Observations of Gamma-ray Bright Blazars

J. D. Linford, G. B. Taylor, F.K. Schinzel(UNM), R.T. Zavala (USNO)

We present early results from our 2 gigabit-per-second VLBA observations of 24 blazars detected by the Fermi Gamma-ray Space Telescope. Each blazar was observed in X-, Ku-, and K-band with full polarization. Our sample contains 10 BL Lac objects and 14 flat-spectrum radio quasars (FSRQs). We investigate the spectral index and rotation measure properties of our target sources.

The importance of spectroscopic redshifts for next-generation radio surveys

Minnie Y. Mao (NRAO), Ray P. Norris(CSIRO), Andrew Hopkins (AAO)

The Evolutionary Map of the Universe (EMU), which will utilise the Australian SKA Pathfinder (ASKAP), will observe 75\% of the sky to 10 microJansky/beam at 1.4 GHz. One of EMU's primary science goals is to study the formation and evolution of radio sources across cosmic time. For this to be achieved, spectroscopic redshifts are essential. Obtaining spectroscopic redshifts over wide-fields is not easy! In this talk I shall describe the EMU survey and ASKAP and I shall introduce the TAIPAN survey. TAIPAN will utilise 6dF, which has the largest FOV of any multi-object spectrograph in the southern hemisphere, and will obtain 500,000 new redshifts for galaxies in the local Universe.

VLBI and Archival VLA and WSRT Observations of the GRB 030329 Radio Afterglow

Robert Mesler, Ylva Pihlstrom, Greg Taylor (UNM, NRAO), Johnathan Granot (Hertfordshire)

We present VLBI and archival Karl G. Jansky Very Large Array (VLA) and Westerbork Synthesis Radio Telescope (WSRT) observations of the radio afterglow from the gamma-ray burst (GRB) of 2003 March 29 (GRB 030329) taken between 672 and 2032 days after the burst. The EVLA and WSRT data suggest a simple power law decay in the flux at 5 GHz, with no clear signature of any rebrightening from the counter jet. We report an unresolved source at day 2032 of size 1.18 ± 0.13 mas, which we use in conjunction with the expansion rate of the burst to argue for the presence of a uniform, ISM-like circumburst medium.

The LCROSS Ejecta Plume Revealed: First Characterization from Earth-based Imaging

Charles Miller, Nancy J. Chanover, Ryan T. Hamilton (NMSU), Brendan Hermalyn (University of Hawaii), Paul D. Strycker (University Wisconsin-Platteville), Robert M. Suggs(NASA)

On 9 October 2009, the Lunar Crater Observation and Sensing Satellite (LCROSS) struck the floor of Cabeus crater at 2.5 km/s. We observed the LCROSS impact with the 3.5 m telescope at the Apache Point Observatory. Using a Principal Component Analysis (PCA) filter, we unambiguously detected an ejecta plume that reaches peak brightness between 12 and 25 seconds after impact. This is the first and only reported image detection of the LCROSS plume from ground-based instruments. We present the results of our LCROSS plume detection and discuss the range of constraints on plume initial conditions implied by our model simulations.

MAGIICAT II. General Characteristics of the MgII Absorbing Circumgalactic Medium

Nikole M. Nielsen, Christopher W. Churchill (NMSU), Glenn G. Kacprzak(Swinburne University of Technology)

Theoretical works and recent observations have established that the circumgalactic medium (CGM) is key to understanding galaxy evolution. The CGM is intimately linked to the star formation history, stellar masses, luminosity, and morphology of its host galaxy. We fully characterize the z < 1 MgII absorbing CGM using the "MgII Absorber-Galaxy Catalog" (MAGIICAT)*, a compilation comprising 169 galaxies within 200 kpc (projected) of background quasars.

We examine the rest-frame equivalent widths, W(2796), covering fractions, fc, and halo gas kinematics against galaxy redshift, B- and K-band luminosity, B-K color, impact parameter, D, and halo mass. We confirm the well-known anti-correlation between W(2796) and D, and find that higher mass galaxies have larger W(2796) at fixed D than lower mass galaxies at the 4.2 sigma level. The covering fractions exhibit clear differential dependencies on host galaxy luminosity and mass. Lower luminosity and lower mass galaxies exhibit no MgII absorption beyond 100 kpc, whereas higher luminosity and higher mass galaxies have fc ~0.2 beyond 100 kpc, with fc decreasing with increasing W(2796) threshold. The radial extent of the MgII absorbing CGM has a much steeper luminosity dependence for bluer galaxies than for redder galaxies. Lastly, we find that the MgII cloud velocity dispersion probability distribution function depends on host galaxy properties such that bluer and lower luminosity galaxies have larger dispersions than redder and higher luminosity galaxies. These results all indicate that the CGM is strongly linked to the properties of the host galaxy.

Many of our findings are in conflict with current theories of galaxy evolution. We address these conflicts and discuss the implications of our results for the cool gas component of the CGM.

VLBA Detection of Compact Emission in the AGN-Driven Star Formation Quenching Candidate NGC 1266

Kristina Nyland (NMT)

We present new VLBA observations of the AGN-driven molecular outflow candidate, NGC 1266. Although other well-known systems with molecular outflows may be driven by star formation in the central molecular disk, the molecular mass outflow rate in NGC 1266 of 13 Msun/year exceeds star formation rate estimates from a variety of tracers. This suggests that an additional energy source, such as an AGN, may play a significant role in powering the outflow. The VLBA observations at 1.65 GHz revealed one continuum source with a diameter d < 8 mas (1.2 pc) and a radio power of log(P) = 20.17 W/Hz, corresponding to a brightness temperature > 1.5 x 10^7 K and most consistent with an AGN origin. The position of the VLBA source is consistent with the location of the peak of the molecular gas originally reported in Alatalo et al. (2011), supporting the possibility that the AGN in NGC 1266 is driving the molecular outflow. These findings suggest that even low-level AGNs may be able to launch massive outflows in their host galaxies.

Evidence for Highly Relativistic Velocities on Kiloparsec Scales in the Jet of the Quasar 3C345

David H. Roberts & John F. C. Wardle, (Brandeis University)

A novel piece of radio polarimetric data has been used to place limits on the fluid velocities on kiloparsec scales in the jet of the quasar 3C345. It is found that speeds of beta >~ 0.95 are required. This is in accord with models for the X-ray emission from 3C345 that invoke inverse-Compton scattering off of the CMB.

Physical Characterization Studies of Near-Earth Object Spacecraft Mission Targets

Eileen V. Ryan and William H. Ryan (NMT/MRO)

Researchers at the Magdalena Ridge Observatory's (MRO) 2.4-meter telescope facility have an ongoing, comprehensive program to determine orbital and physical characterization information of newly discovered objects in the near-Earth population. We present data obtained by photometric, spectroscopic, and other techniques on the physical properties of several Earth-approaching asteroids that are potential spacecraft mission candidates. We will discuss collaborative efforts with researchers using radar to characterize prospective targets, and outline the synergy and increased science return of such an endeavor. In addition, we will present characterization results of the photometric properties of OSIRIS-Rex spacecraft target asteroid 1999 RQ36 at visible wavelengths including its rotation rate and phase function. These data were collected during the 2011-2012 apparition of the asteroid, which is the last opportunity for ground-based studies before the OSIRIS-Rex spacecraft is launched.

Connecting Radio to Gamma-Ray Emission in Blazars Using Common Emission patterns

F.K. Schinzel on behalf of the Fermi/LAT Collaboration, A.P. Lobanov (MPIfR), A. Marscher, S. Jorstad(BU), M. Giroletti (INAF)

With over four years of Fermi/LAT data the prevailing mechanism behind the high-energy production in active galactic nuclei remains puzzling. I am going to present examples of flaring patterns that could be directly connected to structures in the jet observed in the radio, providing us with clues on location and physical mechanisms. Special attention will be given to the peculiar case of 3C 345 that shows a series of recurring flare patterns at gamma-ray energies that can be directly linked to fixed regions in the radio jet which are resolved by mm-VLBI, providing a very accurate localization of emission sites.

An Investigation of Long Baseline Temperature Variations in the Upper Stratosphere of Neptune via Stellar Occultation Events

Kyle Uckert, Chas Miller, Nancy Chanover (NMSU), Cathy Olkin , Leslie Young (SWRI), Heidi Hammel (AURA, SSI), and James Bauer (JPL)

We extract physical atmospheric parameters from a July 23, 2008 single-chord stellar occultation of the star USNO-B1.0 0759-0739128 by Neptune using a light curve model fitting technique. We compare the stratospheric temperature derived from the 2008 occultation to published temperatures of Neptune at similar atmospheric pressures derived from previous stellar occultations and from mid-IR spectral data collected within the last decade. We investigate the effect several heating mechanisms may have on the gradual changes of Neptune's average stratospheric temperature and compare to temperatures derived from observations. This work is supported by funds from NASA grant NAG5-1247.