New Mexico Symposium

TALKS

The BAaDE/ALMA 86 GHz SiO maser survey in the Galactic Bulge
L.O. Sjouwerman (NRAO); Y.M. Pihlstrom (UNM); and the BAaDE collaboration

Ammonia and Methanol Observations in SNRs using the GBT and VLA
Bridget McEwen (UNM/NRAO)

Determining Ages of APOGEE Giants with Known Distances
Diane Feuillet (NMSU)

We present a sample of local red giant stars observed using the NMSU 1m telescope with the SDSS-III APOGEE spectrograph, for which we estimate stellar ages from the high-resolution spectroscopic stellar parameters and accurate distance measurements from Hipparcos. We use a Bayesian technique to estimate age, assuming a constant SFH. To improve the SFH, we use a hierarchical modeling approach to constrain the parameters of a model SFH from the data. We find that age and alpha abundance are related, and the spread in metallicity is lower at younger ages. The also find age-velocity trends that agree with previous work.

Inside-Out Planet Formation
Jonathan C. Tan (University of Florida)

NASA's Kepler telescope has discovered a new class of Systems with Tightly-packed Inner Planets (STIPs), typically with several planets of Earth to super-Earth masses on well-aligned, sub-AU orbits that may host the most common type of planets, including habitable, in the Galaxy. STIPs pose a great challenge for formation theories involving migration from the outer disk and this has motivated radically new models of in situ formation. I review the Inside-Out Planet Formation theory (Chatterjee & Tan 2014), involving sequential in situ planet formation from the inside-out via creation of successive gravitationally unstable rings fed from a continuous stream of small (~cm-m size) "pebbles," drifting inward via gas drag. Predictions of the theory are tested against observed exoplanets.

Target-of-Opportunity Characterization of Sub-200 meter Asteroids
William H. Ryan (NMIMT)

Assessing the threat from the near-Earth asteroid population requires an understanding of the population itself, as well as the dynamics and mechanisms influencing their collisional evolution. Several impacts have occurred in the last decade (e.g., the airburst on February 15, 2013 in Chelyabinsk, Russia) demonstrating that the frequency of these events makes them very real threats. Characterization of sub-200 meter objects is usually limited to when these asteroids make close approaches to the Earth. We present spectral and light

curve data of asteroids obtained near their discovery illustrating how target-of-opportunity strategies are critical to obtaining characterization data on sub-200 meter asteroids.

Solar Physics with Low Frequency Pulsar Observations
Kevin Stovall (UNM)

Comparison of F10.7 and Coronal EUV Emission using DEMS
Sam Schonfeld (New Mexico State University); Stephen White (Air Force Research Laboratory); Rachel Hock (Air Force Research Laboratory); James McAteer (New Mexico State University)

We present initial results comparing F10.7 (the solar radio flux at 10.7 cm, 2.8 GHz) with coronal extreme ultraviolet (EUV) spectroscopy over the rising phase of solar cycle 24. We use differential emission measures (DEMs) calculated from EUV spectra to predict the bremsstrahlung radio emission for comparison with F10.7. We find that the EUV shows significantly less rotational modulation than is observed in F10.7 and note longer term trends at both solar minimum and maximum. These results are discussed in relation to previous work identifying the spatially resolved sources of F10.7 emission in Schonfeld et at 2015.

HF and VHG Radio Emission from Meteor Trails
Kenneth Obenberger (AFRL)

In early 2014, using narrowband all-sky images from the LWA1 radio telescope, we discovered that some trails left by bright meteors radiate below 60 MHz. Later that year we measured broadband spectra of two events between 37 and 55 MHz. The emission may be due to the radiation of electron plasma waves within the trail. If this is the case, the waves must be continually driven, and not just leftover from the initial ablation. Current optical/radio observations are aiming to pinpoint this source of energy. I will discuss early results from these observations.

The Jansky VLA Sky Survey (VLASS) was initiated
Steve Myers (NRAO)

The VLA Sky Survey (VLASS) was initiated to exploit the science and technical opportunities for a new large radio astronomical survey using the Karl G. Jansky Very Large Array. In March 2015, the proposal for the VLASS underwent a formal Community Review. What emerged from this review is a 5400 hour project to survey the 33885 square degrees of the sky above Declination -40 degrees from 2-4 GHz at 2MHz frequency resolution and 2.5" angular resolution. Over the survey duration of 7 years, each area of the sky will be covered in 3 epochs spaced 32 months apart, to a depth of 0.12mJy/beam rms noise per epoch (0.07mJy/beam combined) in total intensity (Stokes I) and including full polarization. Observations are planned to commence in mid-2016. The raw data will be available in the NRAO archive immediately with no proprietary period and science data products will be provided to the community in a timely manner. Calibration, image processing, and analysis for the VLASS Basic Data Products (BDP) will be carried out

through automated pipelines being developed at NRAO, with additional Enhanced Data Products (EDP) and services proposed by the community. We will present the current status and schedule for the VLASS, and discuss opportunities for community involvement in VLASS technical areas, including the development of science-ready Enhanced Data Products and Services.

Exploring dwarf galaxy evolution around Milky Way mass galaxies
Kenza S. Arraki, (NMSU); Anatoly A. Klypin (NMSU); Daniel Ceverino (Universidad Autonoma de Madri); Sebastian Trujillo-Gomez (University of Zurich); Joel R. Primack (University of California, Santa Cruz)

We have run a new suite of hydrodynamical simulations using the ART code to examine the evolution of dwarf galaxies in massive host environments. These are cosmological zoom-in simulations including deterministic star formation and stellar feedback in the form of supernovae feedback, stellar winds, radiation pressure, and photoionization pressure. We simulates galaxies with final halo masses of 10^12 M⊙ with high resolution, allowing us to examine the satellite and isolated dwarf galaxies around each primary galaxy. By reproducing observations of dwarf galaxies in simulations we show how including baryons in simulations relieves tensions seen in dark matter only simulations.

Our astrochemical heritage
Paola Caselli (MPE)

ALMA Observations? The Evolution of ISM Mass in Galaxies at z=1 to 6
Nick Scoville, (Caltech)

The Simulated Circumgalactic Medium
Jacob Vander Vliet (NMSU); Chris Churchill (NMSU); Sebastian Trujillo-Gomez (University of Zurich); Anatoly Klypin (NMSU; Glenn Kacprzak; (Swinburne); Elizabeth Klimeth (NMSU)

LOFAR Imaging of the Low Surface Brightness Radio Lobes of NGC 3998
Kristina Nyland (NRAO)

Although powerful radio AGNs are known to substantially affect their surroundings, they are rare at z~0. Instead, low-luminosity AGNs with weaker radio emission dominate at low-redshifts. Yet, the importance of feedback from these sources is poorly understood. Recently, deep 1.4GHz observations of the nearby S0 galaxy NGC3998 revealed extended, diffuse lobes. Preliminary 150MHz observations resolve the lobes at low frequency, and suggest a steep spectral index. I discuss these results in the context of dynamical timescale constraints from the cold gas properties of NGC3998, and future plans to further study the recent evolutionary history of this galaxy.

The Relative Proper Motion the Virgo Cluster Galaxies M87 and M84
R.C. Walker (NRAO) Fred Davies (MPIA, Heidelberg), R.C. Walter (NRAO)

VLBA phase referencing observations of the relative positions of M87 and M84 between 2001 and 2015 show a likely detection of relative proper motion. The rate near 450 km/s (~6 microarcsec/yr) is reasonable based on the variations in radial velocity in the cluster.

Science with the Next Generation VLA
Juergen Ott (NRAO)

The Expanded Long Wavelength Array (eLWA)
G. B. Taylor (UNM)

Existing capabilities of LWA stations will be briefly introduced together with an outline for the proposed path of the eLWA as an intermediate step toward a full LWA distributed across New Mexico and a commensal 50-500 MHz system at the VLA. The different modes of observations that would be possible by this new instrument will be discussed. Results from the first successful fringe test observations of LWA1 with the VLA will be presented, together with results from commissioning of LWA-SV and fringe tests between LWA stations.

Magdalena Ridge Observatory Interferometer – New Path to First Light
M. Creech-Eakman(NM Tech) I. Payne (Magdalena Ridge Observatory); C. Haniff (Univ. of Cambridge); D. Buscher (Univ. of Cambridge); J. Young (Univ. of Cambridge); V. Romero (NM Tech/Magdalena Ridge Observatory); and the MRO Interferometer Team

The Magdalena Ridge Observatory Interferometer, a 10-telescope optical/near-IR interferometer with baselines ranging from 7.8 to 343 meters, has been conceived to be the most ambitious optical/NIR interferometric array under construction to date. U.S. Congressional, N.M. State and university funding (from NMT and partner funding at the Univ. of Cambridge) attained from 2000-13 provided for a nearly complete system design, installation of a large portion of the physical infrastructure at the Magdalena Ridge, the first telescope, delay line, fringe tracker and many other necessary sub-systems. New funding has recently been obtained under a Cooperative Agreement between NM Tech and the Air Force Research Lab (AFRL) to bring the facility to three fully operational telescopes and associated hardware such that first fringes and closure phase will be realized within 5 years. The completed facility will be able to provide support for observing geosynchronous satellites as well as many exciting observations of astronomical targets. An update on the MROI status, plans moving forward for the next 5 years, and some examples of observational applications feasible at different phases of the array's completion will be presented.

New Mexico Dynamo Experiment: an Experiment to Demonstrate αω-dynamos in Accretion Disks
Jiahe Si, Richard Sonnenfeld, Mark Nornberg, Hui Li, Arthur Colgate, Joe Martinic

The New Mexico Liquid Metal αω-dynamo experiment uses Taylor-Couette flows to simulate the differential rotation of accretion disks. The flow can be made stable or unstable. In the stable region, we have demonstrated an 8-fold ω-gain from differential rotation by minimizing turbulence. In unstable region, we have used two methods to study the effect of the turbulence and have demonstrated that at Re > 5x10^6 rotating shear flow can be described entirely by mean flow induction with very little contribution from correlated velocity fluctuations. The experimental apparatus is being upgraded to demonstrate a complete αω-dynamo.

SWAN: NGC 253's Nucleated Star burst and Environment
M. Gorski (NRAO/UNM)

A Survey for Dual Megamasers: Statistics and Preliminary Trends
Brandon Wiggins (Los Alamos National Laboratory, Brigham Young University)
Victor Migenes (Texas Southern University, Brigham Young University)
Joseph Smidt (Los Alamos National Laboratory)