NRAO eNews

Volume 4, Issue 3 • March 9, 2011

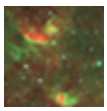
Upcoming Events

ALMA Training & Community Day Events (http://science.nrao.edu/alma/community1.shtml)
Click to view details

Building on New Worlds, New Horizons (http://science.nrao.edu/newscience/)
March 7 - 10, 2011 | Santa Fe, NM

ALMA in the Coming Decade: A Development Workshop (http://science.nrao.edu/alma/alma2011)
Mar 21 - 22, 2011 | Charlottesville, VA

2011 Postdoc Symposium (http://www.nrao.edu/meetings/pdsym2011/)
Apr 11 - 13, 2011 | Charlottesville, VA



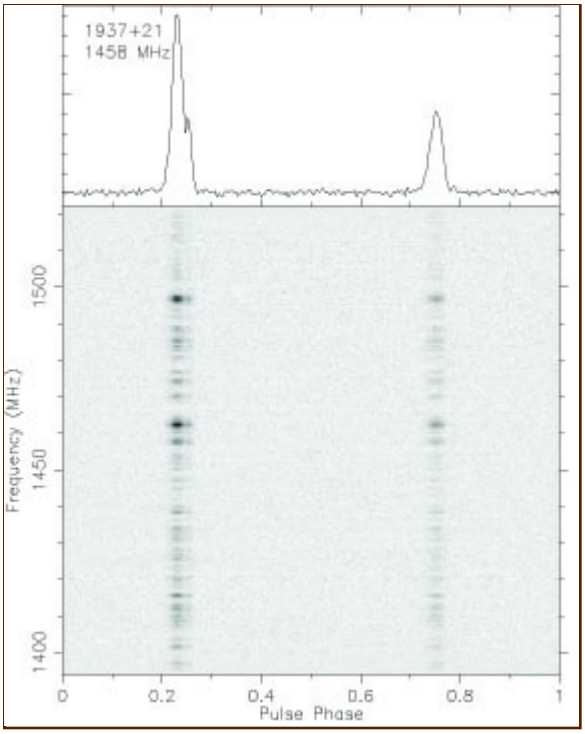
Innovations in Data-Intensive Astronomy (http://www.nrao.edu/meetings/bigdata/)
May 3 - 5, 2011 | Green Bank, WV

Sixth NAIC/NRAO School on Single Dish Radio Astronomy (http://www.nrao.edu/meetings/sds6/)
Jul 10 - 16, 2011 | Green Bank, WV

First Pulsar Detection with the EVLA

Paul Demorest, Adam Deller, Scott Ransom

On February 18, the first Expanded Very Large Array (EVLA) pulsar detection was accomplished by processing phased array voltage data with coherent de-dispersion software. This observation is a successful proof-of-concept for the use of the EVLA as a pulsar-timing instrument.



(images/evlapulsardetection2.png)

Figure 1: The 1.5-ms pulsar B1937+21 observed with the EVLA. The gray-scale shows intensity as a function of pulse spin phase and radio frequency. The plot at top shows the total pulse profile integrated over the entire 128 MHz band. Coherent de-dispersion allows sharp features such as the 'notch' on the trailing edge of the main pulse to be resolved.

Zoom (images/evlapulsardetection2.png)

High-precision timing of millisecond pulsars has a number of scientific applications, including tests of gravity, exploring nuclear physics via neutron star mass measurements, and direct detection of ultra-low frequency gravitational waves (see **NANOGrav (http://www.nanograv.org)**). These studies have traditionally been carried out using large single-dish telescopes. However, the excellent point source sensitivity and octave-bandwidth receivers of the EVLA promise to make it a world-class pulsar-timing instrument as well.

This observation builds on recent efforts to operate the EVLA in phased array mode for very long baseline interferometry (VLBI). In this mode, the array effectively acts as a single large dish, providing a single beam of voltage data similar to the output of a single-dish telescope. For VLBI, the raw data are recorded directly to disk for eventual correlation with other station data. For pulsar timing, a coherent de-dispersion filter is first applied to the data, then they are detected and averaged modulo the pulse period. Coherent de-dispersion must be done pre-detection, and is required to exactly remove the dispersive effects of the interstellar medium from the pulsar signal and achieve the best possible timing results.

For this test, we recorded a 5-minute observation of the bright 1.5-ms pulsar B1937+21 using the

Mark 5 VLBI recorder. These data were then processed offline into coherently de-dispersed pulse profiles using the pulsar processing software DSPSR. Extra software development was required to allow DSPSR to read the VDIF data format produced by the phased EVLA. Using the VLBI recorder limits the achievable data rate, and for this test only a small fraction of the total EVLA bandwidth was recorded and processed: 128 MHz bandwith, dual polarization, 2-bit data. In the final configuration, the raw data will be processed in real time by the correlator backend computer cluster on site, rather than first being recorded to disk. This will allow a total of 1 GHz bandwidth at 8 bits to be used for pulsar timing, and will provide comparable sensitivity to the best existing pulsar observing systems worldwide.

Approved NRAO Science Program: Trimester 2011-A

A total of 245 proposals were received as result of the October 2010 call for proposals for the first 2011 trimester. The GBT and the VLA/VLBA Proposal Selection Committees (PSC) met in the first week of December 2010 to review the referee rankings and technical reports for all proposals, with the goal of providing a recommended science program to the NRAO Director's Office.

A list of the approved EVLA, VLBA/High Sensitivity Array (HSA), and GBT observing programs for Trimester 2011-A is available via the links below. The following is provided for each approved program: (a) PI name; (b) approved proposal title, and the total hours allocated; and (d) proposal type (Regular or Large). For Large proposals or monitoring projects the time allocated may be over more than one trimester.

Expanded Very Large Array (EVLA)

To maximize EVLA Early Science while simultaneously commissioning the hardware and introducing new capabilities, three separate programs were created. They are, in brief: (1) Open Shared Risk Observing (OSRO) which provides first-light EVLA capabilities to the general user community; (2) Resident Shared Risk Observing (RSRO) which provides access to enhanced EVLA capabilities to those who are able to spend time in Socorro to help with commissioning; and (3) an EVLA Commissioning Staff Observing (ECSO) program giving commissioning staff access to the telescope to push new science capabilities.

View a complete list of approved trimester 2011-A EVLA observing programs **here (http://science.nrao.edu/science/programs2011a.shtml#evlalink)** .

Very Long Baseline Array (VLBA) and High Sensitivity Array (HSA)

The 18 newly approved projects for the VLBA and HSA make up only a part of the total science time available. Existing and new Large projects continue to dominate the scheduled observing over Regular projects.

View a complete list of approved trimester 2011-A VLBA/High Sensitivity Array (HSA) observing programs **here (http://science.nrao.edu/science/programs2011a.shtml#vlbalink)** .

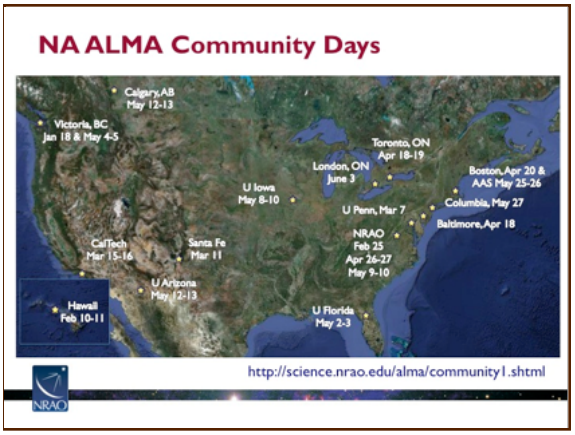
Green Bank Telescope (GBT)

View a complete list of the trimester 2011-A GBT observing programs **here (http://science.nrao.edu/science/programs2011a.shtml#gbtlink)** .

This Month @ the NAASC

North American ALMA Community Day Events

Kartik Sheth



(images/CED Map.jpg)

Figure 1: North American ALMA Community Days scheduled to prepare the community for the ALMA Early Science Call for Proposals. Registration and updated information are at **http://science.nrao.edu/alma/community1.shtml (http://science.nrao.edu/alma/community1.shtml)**

Zoom (images/CED Map.jpg)

The North American ALMA Science Center (NAASC) continues its collaboration with the North American community in hosting ALMA Community Days events across the US and Canada. Numerous events are scheduled between now and the ALMA Early Science Cycle 0 proposal deadline on 30 June 2011.

The ALMA Community Day(s) are one to two day events organized and led by astronomers in their community with a focus on the Early Science capabilities of ALMA, mm/submm interferometry observing techniques, and tools required to design ALMA observing programs and submit proposals. The NAASC staff works closely with the organizers to plan the events so that they best serve the ALMA research interests of the local community. Two or more NAASC staff actively participate in each event, describing ALMA Early Science capabilities and NAASC community support programs, and leading brief demonstrations and/or tutorials on the Early Science user tools, including the Observing Tool for proposal generation and simdata, a tool within the Common Astronomy Software Applications (CASA) package for simulating observations.

The current NAASC Community Days event schedule is below. Some events will include a hands-on

tutorial component for training on ALMA proposal tools. Space for the hands-on workshops may be limited and local participants may be given a preference.

Registration will close three weeks prior to the date of an event and is available here (http://science.nrao.edu/alma/training/pre-registration.shtml) .

March 11: Santa Fe, NM after "Building on New Worlds, New Horizons" Contact: **Kartik Sheth (mailto:ksheth@nrao.edu)**
March 15-16: California Institute of Technology, Pasadena, CA Contact: **John Carpenter (mailto:jmc@astro.caltech.edu) / Eric Murphy (mailto:emurphy@ipac.caltech.edu) / Carrie Bridge (mailto:bridge@astro.caltech.edu)**
April 18: Space Telescope Science Institute, Baltimore, MD Contact: **Rachel Osten (mailto:osten@stsci.edu)**
April 18-19: National Research Council (NRC-CNRC), Toronto, Canada Contact: **Gerald Schieven (mailto:gerald.schieven@nrc-cnrc.gc.ca)**
April 20: Harvard-Smithsonian Center for Astrophysics, Boston, MA Contact: **Sean Andrews (mailto:sandrews@cfa.harvard.edu)**
April 26-27: NRAO, Charlottesville, VA Contact: **Kartik Sheth (mailto:ksheth@nrao.edu)**
May 4-5: National Research Council (NRC-CNRC), Victoria, BC Contact: **Gerald Schieven (mailto:gerald.schieven@nrc-cnrc.gc.ca)**
May 12-13: National Research Council (NRC-CNRC), Calgary, AB Contact: **Gerald Schieven (mailto:gerald.schieven@nrc-cnrc.gc.ca)**
May 2-3: University of Florida, Gainesville, FL Contact: **Jonathan Tan (mailto:jt@astro.ufl.edu)**
May 8-10: University of Iowa, Iowa City, IA Contact: **Cornelia Lang (mailto:cornelia-lang@uiowa.edu) / Daryl Haggard (mailto:dhaggard@northwestern.edu) / Tony Wong (mailto:wongt@astro.illinois.edu)**
May 9-10: NRAO, Charlottesville, VA Contact: **Kartik Sheth (mailto:ksheth@nrao.edu)**
May 12-13: University of Arizona and NOAO, Tucson, AZ Contact: **Joan Najita (mailto:najita@noao.edu) / Xiaohui Fan (mailto:fan@as.arizona.edu)**
May 23-24: AAS meeting, Boston, MA Contact: **Kartik Sheth (mailto:ksheth@nrao.edu)**
May 27: Columbia University, NY Contact: **Andrew Baker (mailto:ajbaker@physics.rutgers.edu)**

NAASC Research Activities

Anthony Remijan

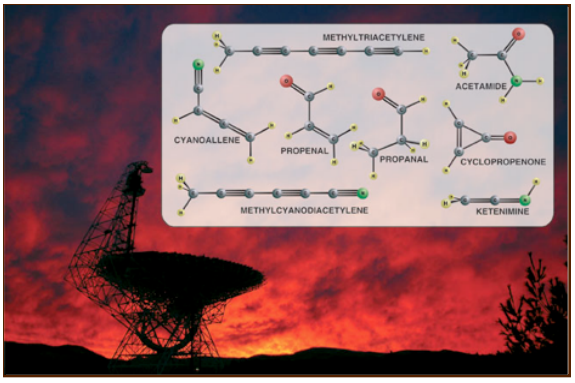
Is it possible to do chemistry 26,000 light years from the Earth? Is it possible to investigate the molecular origins of life in a region of space that is barely above absolute zero? How does organic chemistry happen in space with densities barely larger than 1 molecule per every cubic centimeter? These are the questions that my group and I, including **Robin Pulliam (http://science.nrao.edu/enews/4.3/index.shtml#pulliam)** , a new **NAASC (https://safe.nrao.edu/wiki/bin/view/ALMA/NAASC)** postdoc from the University of Arizona, are investigating.

Working in conjunction with laboratory groups at the University of Virginia, Harvard-Smithsonian Center for Astrophysics, Ohio State University, NIST, and Emory University, My colleagues and I are devising experiments in the laboratory and using the powerful tools of radio astronomy to test their

theories. This collaboration comprises the current members of the Center for Chemistry of the Universe (CCU), an NSF funded Center for Chemical Innovation (CCI) that was formed to test the fundamental theories of chemistry in the extreme environments of interstellar space.

The process of discovery starts with a fundamental mechanistic understanding of chemistry that leads to a prediction that can be tested under laboratory conditions. If the conditions in the lab are set up properly, they mimic a region of interstellar space. From both the theoretical prediction and the laboratory work, an experiment is devised that utilizes radio astronomical observations. These observations are conducted with either single dish telescopes like the GBT or with arrays like CARMA, EVLA and very soon, ALMA. One of the tools that we use are spectral line surveys of the interstellar medium.

Molecular line surveys study the spectra of astronomical sources over a wide, hopefully continuous, range of frequencies, to determine chemical composition (i.e. "molecular inventory"), physical properties (temperature, density) and kinematics. Primarily the lower energy transitions of molecules of astrophysical interest are excited at the cold temperatures of molecular clouds, and these rotational transitions range from the radio to sub-millimeter wavelengths. Until recently radio receivers had instantaneous spectral bandwidths that covered only very small fractions of the wavelength regions of interest. Consequently, searches for and studies of interstellar molecules have traditionally been targeted towards the narrow regions around laboratory-measured transition frequencies of specific molecules. In contrast, spectral line surveys were very time-consuming and could only be carried out at those radio observatories that were willing to devote significant observing time to a survey project.



(images/4_3_naascresearchactivities1.png)

Figure 1: A sample of the molecular species detected with the GBT. (Bill Saxton, NRAO/AUI/NSF) **(http://science.nrao.edu/alma/community1.shtml)**

Zoom (images/4_3_naascresearchactivities1.png)

In 2007, the Prebiotic Molecule Survey (PRIMOS) was undertaken to provide complete spectral line data between 300 MHz and 50 GHz toward Sagittarius B2(N) using the GBT. Sgr B2(N) is the preeminent source for the study of large complex interstellar molecules and has been the target of numerous spectral line surveys ranging from the mm to submm. Of the ~170 astronomical molecules detected to date, more than half have been first discovered toward this region. The Sagittarius B2

complex also contains compact hot molecular cores, molecular maser-emitting regions, and ultra-compact sources of continuum radiation surrounded by larger-scale continuum features, as well as more extended molecular material. To date, PRIMOS data have led to the discovery of 3 new interstellar molecules; provided a database of Voigt recombination line profiles; uncovered a rich organic molecular inventory in the intervening spiral arms between our local environment and the Galactic center region; and provided the observational data necessary to test formation chemistry of large organic species. The data made available from PRIMOS through the Spectral Line Search Engine also allows easy access to the data by the community. Therefore, not only will these data continue to enrich the astronomical community with spectral line data products, they will also provide training to a new generation of scientists investigating the formation of molecular species in extreme environments.

For more information about the PRIMOS survey, visit **www.cv.nrao.edu/~aremijan/PRIMOS (http://www.cv.nrao.edu/~aremijan/PRIMOS)** or e-mail Anthony Remijan at **aremijan@nrao.edu (mailto:aremijan@nrao.edu)** . For more information about the CCU including graduate student and postdoc opportunities, visit **www.virginia.edu/ccu (http://www.virginia.edu/ccu)** .

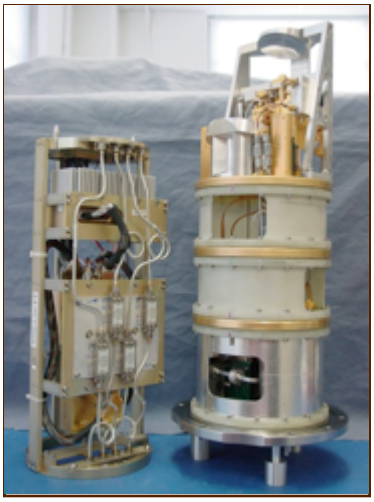
Meet the NAASC: Robin Pulliam

Robin Pulliam, a post-doc at the North American ALMA Science Center (NAASC), earned her PhD at the University of Arizona in Physical Chemistry, with a minor in Astronomy, under the direction of Lucy Ziurys. Her graduate research was focused on astrochemistry, working both in the laboratory and with single dish telescopes. Her laboratory work involved identifying the rotational spectra of radical transition metal species of astrochemical and astrophysical interest. Robin was, and remains, particularly interested in understanding the chemistry within the circumstellar envelopes of massive evolved stars: supergiants and asymptotic giant branch stars. Her main focus, however, is to understand how the chemistry varies through the different stages of evolution, from molecular clouds and star forming regions through planetary nebula.

"Coming to the NRAO - NAASC is an excellent opportunity for me to develop great collaborations in astrochemical research as well as learn from the best in interferometric techniques (something I have limited experience with). Since arriving in June 2010, I have already learned a tremendous amount."

ALMA in the Coming Decade: A Development Workshop

21-22 March 2011 at NRAO-Charlottesville, Virginia



(images/4_3_almacomingdecade1.png)

Figure 1: An ALMA Band 6 Receiver. The Warm Cartridge Assembly (left) provides the local oscillator signals to the SIS mixers in the Cold Cartridge Assembly (right).

Zoom (images/4_3_almacomingdecade1.png)

ALMA will transform astronomy beginning with Early Science results later this year. It will reach full operation by 2013 and will eclipse any current millimeter or submillimeter array in sensitivity and resolution by nearly two orders of magnitude. ALMA will operate from 3mm to 0.3mm across a decade of nearly complete frequency access as enabled by its broad bandwidth receivers, powerful correlators and spectacular site. Having invested ~$1.3B to realize the biggest historical advance in ground-based astronomy, it is vital to maintain and expand its capabilities.

Toward this end, the ALMA Operations Plan envisages an ongoing program of development and upgrades that may include hardware, software, or data analysis tools. With a modest investment of less than 1% of capital cost per year (eventually about $13 million USD) divided among the three funding regions (North America, Europe, East Asia), ALMA will continue to lead astronomical research through the 2011-2020 decade and beyond.

In recent years, several programs that could spearhead a development plan have been identified by the scientific community. For example, ALMA's wavelength coverage could be extended to cover from 1 cm to 200 microns and thereby encompass additional unique spectral features and important scientific topics. To further explore such ideas, the North American ALMA Science Center (NAASC) will soon invite Proposals from North American entities for studies relevant to the crafting of an ALMA Development Plan. All interested parties located within the North American ALMA partnership are eligible to participate in these studies.

The primary aims of these studies are to:

- give groups in North America the opportunity to propose ALMA upgrades that may later be implemented as part of the ALMA Development Plan;

- support the development of conceptual and detailed designs for ALMA upgrades; and
- encourage relevant long-term research and development in areas important for ALMA.

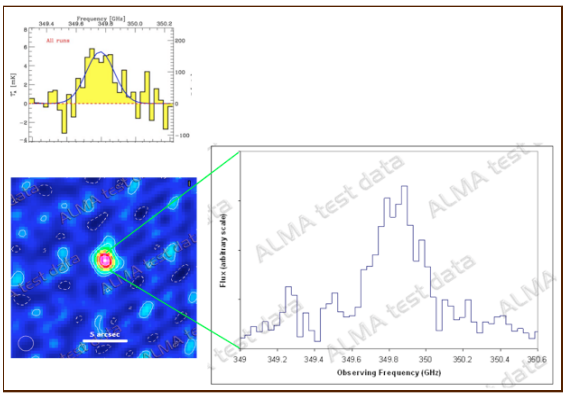
The completed studies will be used, together with similar studies from the other ALMA partners, to devise and implement the ALMA Development Plan.

To help initiate this process, an ALMA Development Workshop is being held in Charlottesville on 21-22 March 2011. At the workshop, we will present the scientific motivation for a suite of key science goals driving possible development projects in hopes of stimulating further discussion and thinking. The second part of the workshop will allow us to explore ideas for development projects in more detail and how these projects can be effectively managed. An agenda will be forthcoming. While we now plan no formal program for the second day, participants are invited to present their ideas for participation in ALMA/NA Development in a discussion session.

Registration (http://science.nrao.edu/alma/alma2011/index.shtml) for the ALMA Development Workshop is now open. Please make your hotel reservations as soon as possible to ensure availability.

ALMA Early Science and Science Verification

Al Wootten



(images/4_3_almaessv.png)

Figure 1: [bottom] As a test of ALMA's ability to observe broad spectral lines, ALMA observed the lensed galaxy BRI 0952-0115, which is at a redshift z = 4.43. The object is unresolved on short baselines, but the 158 micron line from ionized carbon is clearly detected in the spectrum, which is impressive given that this observation took only one hour in total. [top] Maiolino et al (2009) APEX detection of the same feature.

Zoom (images/4_3_almaessv.png)

The first release of ALMA test data to the astronomy community will be through the Science Verification program. Science Verification will involve observations of objects designed to test ALMA systems and confirm their performance. The first data from these tests is expected to be available by the time of the ALMA Early Science Cycle 0 Call for Proposals. ALMA Test Images provide an excellent means to visualize ALMA's progress toward Early Science. Several of these images have

been released by the Joint ALMA Observatory (JAO).

Figure 1 provides a view of ALMA eight-antenna test data, a verification of ALMA's ability to reproduce the broad [C II] line observed by Maiolino etal (2009) toward the distant (z=4.43) lensed BRI 0952-0115. A Call for Proposals for ALMA Early Science ('Cycle 0') will be issued by the JAO on 31 March 2011. The capabilities of the array available for the Call will be issued shortly, but will include availability of receivers at 3mm, 1.3mm, 0.85mm and 0.45mm on baselines up to 250m on an array of 16 antennas. See **http://science.nrao.edu/alma/earlyscience.shtml (http://science.nrao.edu/alma/earlyscience.shtml)** for additional information.

Reference

Maiolino, R., Caselli, P., Nagao, T., Walmsley, M., De Breuck, C., & Meneghetti, M. 2009, A&A, 500, L1.

ALMA Construction Status

Al Wootten

(images/DV01Move2.jpg)

Figure 1: The mighty 'Otto', one of two ALMA antenna transporters, moved antenna DV01 from the Operations Support Facility location to the 16,500 ft elevation Array Operations Site, where it will be incorporated into the commissioning array. Note the antennas in the AEM construction camp at left rear and several more antennas in the Melco camp between the AEM camp and the OSF building. On the right stand Vertex antennas DV03, DV12 and DV10. There were 20 antennas undergoing construction and tests at the OSF before the departure of DV01.

Zoom (images/DV01Move2.jpg)

The Operations Support Facility (OSF) hosts a forest of ALMA antennas. In addition to the ten antennas at the Array Operations Site (AOS), 27 antennas are in various stages of construction at the OSF, with 19 erected and visible to the observer. Some are in crates awaiting assembly, others are assembled within buildings. The DV12 (Vertex antenna No 12) acceptance review was held 4 February 2011. The review committee recommended the final acceptance for DV12, the first antenna to achieve this milestone. All previous antennas have been accepted conditionally, subject to further testing.

(images/4_3_almaconstructionprogress2.png)

Figure 2: Eight antennas on the Atacama Compact Array (ACA) foundations were joined by a ninth antenna on distant pad A136, barely visible on the left in the distance. Note the snow dusting the ground.

Zoom (images/4_3_almaconstructionprogress2.png)

At the AOS, antenna DV01 was returned to a long baseline pad, A136, on 19 February. DV10 was accepted late in the month and is scheduled to join its siblings on an ACA station in early March. Weather has been a problem during the period, which featured, ironically, some of the heaviest midsummer tropical snows recorded since site characterization began in 1994. For example, the median humidity for February was ~ 93%, and the desert around the town of San Pedro is unusually green. Nonetheless, a 'simulation mode' on the array has allowed critical software testing to progress interstitially with commissioning and science verification (CSV) testing, which has continued during the better weather. Particular attention has been paid to implementing a 'mosaic' mode of imaging and to testing polarization measurement with ALMA. A group of experts, including George Moellenbrock, Richard Crutcher, Ramprasad Rao and Juan Carlos Algaba Marcos, joined the CSV team for the polarization campaign. Results from these tests are under study.

NRAO Proposal Evaluation and Time Allocation: Progress

Tim Bastian and Joan Wrobel (Observatory Science Operations)

Significant progress has been made in implementing the new proposal evaluation and time allocation process for NRAO's Green Bank Telescope, Expanded Very Large Array and Very Long Baseline Array. Over 300 proposals were received at the 1 February 2011 submission deadline for semester 2011-B. Drawing from the community, eight Science Review Panels (SRPs) have been constituted, each covering a science category. In aggregate, the SRP categories span the broad spectrum of modern research in astronomy and astrophysics. The semester 2011-B proposals are currently undergoing science review by the SRPs and technical review by NRAO staff. The results of these reviews will be cross-reconciled by the Time Allocation Committee (TAC). The TAC consists of the chairs of the SRPs and is charged with recommending a science program for semester 2011-B to the NRAO Director. Disposition letters for semester 2011-B proposals will likely be sent in early June.

We have been very gratified by the community's willingness to serve on the new SRPs and TAC, and we are confident that this community effort will ensure the best scientific use of NRAO's facilities.

2011 Jansky Fellowships Awarded

Tim Bastian, Chris Carilli, Miller Goss

The NRAO Jansky Fellowship program provides outstanding opportunities for research in astronomy. Jansky Fellows formulate and carry out investigations either independently or in collaboration with others within the wide framework of interests of the Observatory. The program is open each fall to candidates with interest in radio astronomy instrumentation, computation, and theory, and prior radio experience is not required. Multi-wavelength projects leading to a synergy with NRAO instruments are encouraged.

We are pleased to announce that four new Jansky Fellows will be joining NRAO in 2011.

Arielle Moullet, currently a Submillimeter Array fellow at Harvard CfA, will begin her Jansky Fellowship at the NRAO in Charlottesville, Virginia this fall.

During her Fellowship, Arielle will work with the North American ALMA Science Center as ALMA opens to the scientific community in its Early Science phase. Her research interests include the study of surfaces and atmospheres of the solar system planets with (sub)millimeter interferometers, particularly the study of Jupiter's volcanic moon, Io, and its unusual atmosphere, measurements of Kuiper Belt Object sizes and albedos, the distribution of minor species in Neptune, and the dynamics of the upper atmosphere of Venus.

Michael Busch, currently a postdoc at UCLA, will begin his Jansky Fellowship at UCLA this fall. He will spend the latter half of his Fellowship at NRAO in Socorro, New Mexico.

His research focuses on planetary radio astronomy, particularly asteroids. In combination with the radar transmitters at Arecibo and Goldstone, he has been using the VLBA to measure the orientation of near-Earth asteroid rotational axes, essential data for understanding the physical properties of these objects and to predict potential future Earth impacts. As ALMA becomes available, he would like to extend his work from the near-Earth objects to the main asteroid belt, surveying the shapes, spins, surface temperature and composition, and masses and densities of as many objects as possible.

Brian Lacki, currently a PhD student at Ohio State University, will be hosted by the Institute for Advanced Studies as a Jansky Fellow beginning this fall. Brian expects to receive his PhD in Astronomy from Ohio State University in July 2011.

In his previous work, Brian has studied how cosmic rays (CRs) travel and cool through galaxies with the "diffusion-loss equation". During his Fellowship, Brian proposes to develop a code to model where CRs are in galaxies. This code will be designed to handle a wide range of physical conditions, from the faintest galaxies to the most intense star-forming regions. Brian also intends to study the relatively unknown effects of AGNs on their host galaxies' radio emission. As they penetrate molecular clouds, CRs may provide feedback and ionize gas, causing heating that is visible in CO lines.

Sui-Ann Mao, currently a Ph.D. student at Harvard University, will be joining NRAO as a Jansky Postdoctoral Fellow hosted by the University of Wisconsin-Madison this fall. Ann expects to receive her Ph.D. in Astronomy from Harvard University in August 2011.

As a Jansky Fellow, Ann will investigate how galaxy interactions influence the evolution of galactic-scale magnetic fields using multi-wavelength polarimetry. Her research will focus on mapping the magnetic universe using radio polarization. She is excited about the prospects of the EVLA and the revolution it will bring to the field of cosmic magnetism.

2011 Jansky Lectureship Nominations Open

Chris Carilli

The National Radio Astronomy Observatory invites nominations for the **2011 Jansky Lectureship (http://www.nrao.edu/jansky/janskyprize.shtml)** . The Karl G. Jansky Lectureship is an honor established by the trustees of Associated Universities, Inc. to recognize outstanding contributions to the advancement of radio astronomy. First awarded in 1966, it is named in honor of Karl G. Jansky who, in 1932, first detected radio waves from a cosmic source.

Please send your nomination, including a concise justification for your choice, to jutley@nrao.edu (mailto:jutley@nrao.edu) by the deadline of 22 March 2011.

NRAO to Host Innovations in Data-Intensive Astronomy Workshop

Amy Shelton

Discovering the unusual or unexpected in scientific data is often the path to the most fundamental breakthroughs in physical sciences. Yet as scientific data grows in size, our ability to understand and to find the unexpected rapidly diminishes with current tools. Experimental scientific data is doubling every year due to successive generations of inexpensive sensors and exponentially faster computing. Astronomical data sets are no exception. Exciting scientific breakthroughs will be found as astronomers manipulate and explore massive datasets, but will require advanced computing capabilities and infrastructure, new algorithms, and a focus on data-intensive science.

The Innovations in Data-Intensive Astronomy Workshop, hosted by the NRAO, will bring together members of the astronomical, computing, and software communities to facilitate discussion and collaborations for data-intensive scientific computing, focusing on the science goals of the Astro 2010 Astronomy and Astrophysics Decadal Survey.

The workshop will be held 3-5 May 2011 in Green Bank, West Virginia and will focus on encouraging new ideas for the effective processing, analysis, and interpretation of Tera- to Peta-scale data sets as well as promoting the establishment of collaborations to develop those ideas. To foster a workshop atmosphere that encourages discussion and interaction, there is a 45 attendee limit for on-site participation. However the workshop will accommodate a larger audience through webcast, as the

topics covered as well as the resulting discussions are of wide interest. As part of the webcast, remote participants will be given the opportunity to interact with speakers and participate in discussions in real time through web chat.

Visit **http://www.nrao.edu/meetings/bigdata (http://www.nrao.edu/meetings/bigdata)** for additional information.

2011 Grote Reber Gold Medal Award

Ken Kellermann

The 2011 Grote Reber Gold Medal for lifetime innovative contributions to radio astronomy will be awarded to Dr. Jocelyn Bell Burnell who is currently a Professor of Astrophysics at Oxford University in England. Burnell is being honored for her dramatic 1967 discovery of pulsars, which has had a major impact on 20th century astrophysics, and her continuing contributions to astrophysics and education.

Jocelyn Bell Burnell received her first degree in Physics in 1965 from Glascow University in Scotland and her PhD from the University of Cambridge in 1968. Following a two year Science Research Council Fellowship, she held a Teaching Fellowship at the University of Southampton followed by research and management positions at the University College, London and the Royal Observatory in Edinburgh. After a ten year period as a Professor of Physics at the Open University of the United Kingdom where she studied X-ray sources, she served as Dean of Science at the University of Bath.

Bell-Burnell is best known for her role in the discovery of pulsars. As a research student in Cambridge she was heavily involved in the construction and operation of a long wavelength radio telescope built to study interplanetary scintillations at 4 m wavelength. Later, while inspecting the output chart records, she noticed a peculiar signal form that had a periodic pulse rate close to one second. Like Grote Reber, she initially had to convince her better-established colleagues that her observations were important for astronomy and not due to external interference or a spurious instrumental effect.

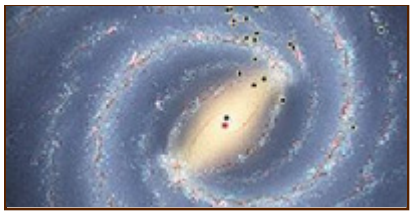
She has previously been honored by many prizes and recognitions, including the Albert Michelson Medal of the Philadelphia Franklin Institute, the J. Robert Oppenheimer Memorial Prize from the Miami Center for Theoretical Studies, the Tinsley Prize from the American Astronomical Society, and the Herschel Medal from the Royal Astronomical Society. She has served as President of the Royal Astronomical Society, is a Fellow of the Royal Society, is currently the President of the Institute of Physics, and in June 2007, she was made Dame Commander of the British Empire (DBE) by Queen Elizabeth II.

The 2011 Reber Medal will be presented to Dame Jocelyn in August 2011 at the XXX URSI General Assembly in Istanbul, Turkey.

The Reber Medal was established by the Trustees of the Grote Reber Foundation to honor the

achievements of Grote Reber and is administered by the Queen Victoria Museum in Launceston, Tasmania. Nominations for the 2012 Medal may be sent to Martin George, Queen Victoria Museum, Wellington St, Launceston, Tasmania 7250, Australia or by e-mail to: **martin@qvmag.tas.gov.au (mailto:martin@qvmag.tas.gov.au)** to be received no later than 15 October 2011.

Recent Press Releases



Super-Sharp Radio 'Eye' Remeasuring the Universe (http://www.nrao.edu/pr/2011/vlbameasures/)
19 February 2011

Using the super-sharp radio "vision" of astronomy's most precise telescope, scientists have extended a directly-measured "yardstick" three times farther into the cosmos than ever before, an achievement with important implications for numerous areas of astrophysics, including determining the nature of Dark Energy, which constitutes 70 percent of the Universe. **Read more... (http://www.nrao.edu/pr/2011/vlbameasures/)**

From the Archives

Ellen Bouton

(images/4_3_archives.png)

About this month's photograph: This year is the centennial of Grote Reber's birth. This photo was taken when he visited the VLA on 23 March 1976. In 1966 and 1967 he wrote repeatedly to Everett Hurlburt, NSF Program Director for Radio Astronomy, urging him not to fund "technological dinosaurs" such as the NRAO Largest Feasible Steerable Telescope project and the VLA, saying, "Decades will pass before either could be realized." By the time he visited the VLA, Reber had changed his opinion enough to write on 4 May 1976 to Jack Lancaster, VLA Project Manager, "The day at VLA was enlightening. I know a lot of difficult groundwork has gone into getting the project this far. From now on the plant will show rapid development. Someday I will come and make observations with this radio telescope to end all radio telescopes."

From the Archives is an ongoing series illustrating NRAO and U.S. radio astronomy history via images selected from our collections of individuals' and institutional papers. If readers have images they believe would be of interest to the Archives, please contact **Ellen Bouton (mailto:ebouton@nrao.edu)** .

Career Opportunities

New Postings

ALMA Commissioning Scientist (https://careers.nrao.edu/applicants/Central?quickFind=50633) : The Joint ALMA Observatory (JAO) in Santiago, Chile, is recruiting for a Commissioning Scientist. The role of the ALMA Commissioning Scientist is to assist the Project Scientist and Deputy Project Scientist in planning and executing the scientific commissioning of ALMA.

CO-OP Student (https://careers.nrao.edu/applicants/Central?quickFind=50622) : The National Radio Astronomy Observatory in Socorro, NM is seeking a CO-OP student to work in the Electronics Division. The work assignment will involve performing RFI and EMC testing at the Very Large Array. Tasks will also include the collection, analysis and presentation of monitoring system data, the location, identification and mitigation of detected RFI, and performing RF power measurements in a RF reverberation chamber. The position is temporary full-time for a period up to six months.

CO-OP Student (https://careers.nrao.edu/applicants/Central?quickFind=50616) : The National Radio Astronomy Observatory in Socorro, NM is accepting applications for a CO-OP Student who will employ mechanical engineering design principles in designing electronic systems / subsystems enclosures and electronic assemblies packaging as required for the manufacture of both ambient and cryogenically cooled radio receivers. The CO-OP position is temporary full-time and applicable to the summer break period only.

ALMA Project Manager (https://careers.nrao.edu/applicants/Central?quickFind=50621) : The Joint ALMA Observatory (JAO) is seeking a Project Manager with outstanding management abilities for the construction of the international ALMA radio astronomy observatory in Santiago, Chile. The Project Manager is responsible for the overall direction and coordination of the ALMA construction and integration conducted by the JAO and the three (European, East Asian and North American) Executives, and for maintaining the integrity of the construction schedule, work breakdown structure, cost development and assignment of deliverables.

Assistant Director, New Mexico Operations (https://careers.nrao.edu/applicants/Central?quickFind=50610) : The National Radio Astronomy Observatory in Socorro, New Mexico is accepting applications for an Assistant Director of New Mexico Operations (AD-NM). The AD-NM is responsible for the overall planning, management, and direction of all activities associated with New Mexico Operations. The AD-NM will provide scientific leadership and set science-driven operational priorities for both the Expanded Very Large Array (EVLA) and Very Long Baseline Array (VLBA), within the context of Observatory-wide Science Operations (OSO).

Head of the ALMA Department of Engineering (https://careers.nrao.edu/applicants/Central?quickFind=50619) : The Joint ALMA Observatory (JAO) in Santiago, Chile, is recruiting a senior engineering manager with extensive experience to lead its Department of Engineering, which is responsible for the assembly and integration and the engineering operation of the observatory. The Head of ADE will be responsible for the engineering and technical staff within the JAO and for the work outcomes from those staff including assembly, integration and verification activities, systems integration efforts, and the ongoing engineering operations of the array.

Staff | **Policies** | **Diversity**

The National Radio Astronomy Observatory is a facility of the National Science Foundation
operated under cooperative agreement by Associated Universities, Inc.