



## Upcoming Events



### Filamentary Structure in Molecular Clouds

(<https://science.nrao.edu/science/meetings/2014/filamentary-structure>)

Oct 10 - 11, 2014 | Charlottesville, VA



### 4th VLA Data Reduction Workshop (<https://science.nrao.edu/science/meetings/2014/vla-data-reduction>)

Oct 27 - 31, 2014 | Socorro, NM



### Revolution in Astronomy with ALMA - The Third Year (<http://www.almasc2014.jp/>)

Dec 08 - 11, 2014 | Tokyo, Japan



### US Radio Futures: Building from ALMA & VLA ([/enews/7.10/index.shtml#beyond\\_vla](/enews/7.10/index.shtml#beyond_vla))

Jan 04, 2015 | Seattle, WA

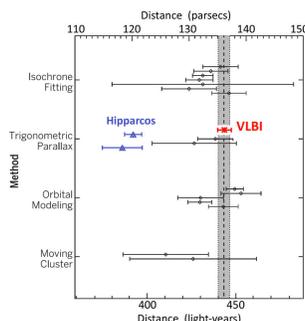


### NRAO Town Hall at the 225th AAS Meeting

(<https://science.nrao.edu/science/meetings/2015/aas225/townhall/>)

Jan 06, 2015 | Seattle, WA

## An Accurate, Precise Pleiades Distance Measurement



**Fig. 1:** The Pleiades distance, as measured by several different methods.

As a young nearby star cluster, the Pleiades hold an important place in our understanding of stellar evolution. Its hundreds of stars help to define the zero-age main sequence, and serve as templates for determining the physical characteristics of more distant stars. Because many derived physical properties of stars depend on their distance raised to some power, the distance to the Pleiades is an important measurement whose accuracy propagates throughout modern stellar physics.

It was of some concern, therefore, when results from the *Hipparcos* astrometric satellite suggested that the traditional distance to the Pleiades – about 135 pc via multiple techniques – was 10% too high and that the cluster was located only 120 pc away. At the closer distance some stars in the Pleiades would be decidedly peculiar, possibly implying enhanced helium abundances, and hinting of serious flaws in our understanding of fundamental stellar evolution.

To resolve the issue a group of scientists led by Carl Melis (UC, San Diego) undertook a campaign of precise radio astrometry on several Pleiades stars that are weak radio sources. They measured the annual stellar



parallax with respect to a background quasar over a period of about 18 months. Because of the weakness of the radio stars, a network of radio telescopes was used which included the Very Long Baseline Array and the Green Bank Telescope, with the Arecibo and Effelsberg radio telescopes as well. The resultant distances to four stars had uncertainties of 0.5 to 1.1 pc and thus a 99+% precision in the measured distance. After taking into account that the stars probably lie at different depths in the cluster, an effect estimated from the angular size of the cluster on the sky, the very long baseline interferometry measurements produce a cluster distance for the combined sample of  $136.2 \pm 1.2$  pc. This is the most accurate and precise distance measurement for the Pleiades, and is compatible with most previous measurements, except for that from the *Hipparcos* satellite.

Figure 1 shows a summary of the distance measurements. It is now of considerable interest to understand the source of the systematic error in the *Hipparcos* results, as the astrometric satellite *Gaia*, a successor to *Hipparcos* with considerably enhanced capabilities, has similarities of design and data analysis, and is now mapping the Milky Way to a considerable depth.

**Reference:** Melis, C., Reid, M.J., Mioduszewski, A.J., Stauffer, J.R., Bower, G.C. 2014, *Science*, 345, 1029 (29 August 2014).

## Large Grains in the Star-forming Filament OMC-2/3



**Fig. 1:** Radio/optical composite of the Orion Molecular Cloud Complex showing the OMC-2/3 star-forming filament. Orange: GBT data. Credit: S. Schnee et al.; B. Saxton, B. Kent (NRAO/AUI/NSF); NASA-Goddard SkyView.

The star-forming material in the Orion molecular cloud complex known as OMC-2/3 is organized into a skein of twisted dust-rich filaments dotted with many dense cores. Thermal continuum emission from the dust can be detected at mm-wavelengths, while the gas temperature in the dense cores has been derived from  $\text{NH}_3$  line ratios measured with the Very Large Array and Green Bank Telescope (GBT). Thermal emission from dust is modeled as a modified blackbody spectrum with a frequency dependence given by the power-law slope  $\beta$ , the emissivity spectral index. The quantity  $\beta$  is observed to vary with location in the interstellar medium and with the stage of a protostar's evolution; in molecular clouds and cloud cores it has a typical value of +1.5 to +2.5.

Recent measurements in the 3.3mm continuum using the MUSTANG bolometer array on the GBT by Schnee et al. (Figure 1) show that the filaments are significantly brighter than would be expected and thus imply a low value for  $\beta < 1$ . An index this low has been seen previously only in the disks around pre-main sequence stars and brown dwarfs, and has been attributed to emission from dust grains with sizes up to a few mm.

The GBT OMC-2/3 results thus suggest the presence of large grains or pebbles with a size of at least 1 mm and perhaps as large as 1 cm, in the dense parts of the filament to which the measurements are most sensitive. These grains are much larger than typically found in the diffuse interstellar medium, and this would be the first report of large grains in structures with scales on the order of 1 pc.

Although a power-law spectrum has been used successfully to model dust emission from many different environments, the shallow spectral index between 1 and 3 mm could alternatively indicate that a more complex

model is needed for OMC-2/3. In either case, more detailed observations are required to study the full dust spectral energy distribution in filaments so that the data can be used to make accurate measurements of mass, temperature, and the possible existence of large grains.

### Reference:

Schnee, S., Mason, B., Di Francesco, J., Friesen, R., Li, D., Sadavoy, S. & Stanke, T. 2014, MNRAS (in press).

## US Radio Futures: Building from ALMA & VLA

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An NRAO Workshop at the Seattle AAS Meeting  
Washington State Convention Center, Room 616/617  
Sunday, 4 January 2015, 9am - 5pm PST



The Karl G. Jansky Very Large Array (VLA) began full science operations in January 2013 after the decade long EVLA upgrade project in which the capabilities of the telescope were improved by an order of magnitude in several parameters. Today the VLA is in high demand by the scientific community for carrying out priority science goals as delineated in the 2010 National Academies Astronomy and Astrophysics report *New Worlds, New Horizons in Astronomy and Astrophysics*. Centimeter radio astronomy is an important, exciting, and growing element of modern astronomy.

Inspired by the science now coming from the Atacama Large Millimeter/submillimeter Array, and anticipating exciting new observational capabilities from instruments like the Square Kilometre Array and the James Webb Space Telescope, the US community has begun to consider new roles that centimeter (cm) radio astronomy science can play in the coming decades. This workshop, organized by NRAO and envisioned as the first in a series, is designed to broaden our discussions with the community, develop a deeper understanding of the future science opportunities at meter to submillimeter wavelengths, and foster new interactions with the US university community. This workshop will include discussion of the scientific and technological opportunities and challenges in cm radio astronomy, as well as US and international interests in producing powerful new capabilities for the astronomy community.

The workshop will be an open forum for the discussion of new and expanded science areas for cm radio astronomy – a future science case. An important outcome of this meeting will be identifying the technological and operational developments that will be needed in the next decade to enable scientific progress. To facilitate and organize the discussion, working groups have been established to consider key science programs that could be addressed. The four working groups are:

- *Cradle of Life*: (proto-)planetary systems and formation; cloud cores to stars; astrochemistry/biology; Solar System; SETI
- *Galaxy Ecosystems (baryon cycle)*: Galactic structure; interstellar medium and star formation; star formation laws, nearby galaxies; outflows and inflows; supermassive black holes (SMBHs)
- *Galaxy Assembly through Cosmic Time (high z universe)*: cool gas and dust; dynamics; AGN/SMBHs
- *Time domain, Cosmology, Physics*: Transient sky; synoptic surveys; AGN physics; high energy phenomena; stellar phenomena; pulsars.

The meeting will consist of invited talks by world experts in the field, breakout sessions, report-outs by the working groups, and open discussion. These working groups will be community-led, and we are hoping for

strong participation from the US and international astronomy community. If you are interested in participating, please send an email stating your interests to Chris Carilli ([ccarilli@nrao.edu](mailto:ccarilli@nrao.edu) (#)) and Bryan Butler ([bbutler@nrao.edu](mailto:bbutler@nrao.edu) (#)).

## VLA Sky Survey Proposal Draft Available

Stefi A. Baum (VLASS SSG Co-Chair), Eric Murphy (VLASS SSG Co-Chair), Claire Chandler (NRAO VLASS Project Director), Steven Myers (NRAO VLASS Technical Lead), For the Science Survey Group (SSG)



The first draft of the VLA Sky Survey (VLASS) proposal is now posted on the [NRAO VLASS wiki](#)

(<https://safe.nrao.edu/wiki/pub/JVLA/VLASS/VLASS.v11.pdf>). This draft has undergone some internal review and comment, and is currently being revised based on those comments. In devising this plan, the science white papers have been used and built upon to create a broad-based, three-tiered, 2 - 4GHz high-resolution survey with all-sky, wide area, and deep field components. Although each individual tier could have made use of the full observing time to best promote those science goals, it was felt by the Survey Science Group (SSG) that a combined survey would provide the greatest impact for the widest user base.

The next steps for the VLA Sky Survey process are as follows:

15 October	Submit preliminary proposal to NRAO for review
15 November	NRAO internal scientific and technical proposal review complete
1 January	Submit final proposal and response to NRAO internal review, post final proposal for community viewing and comment
15 February	Close community comment period
4-6 March	VLASS external Community Review

There will be a 1.5 month period during which the community may comment on the final VLASS proposal, and all comments from this period will be provided as input to the Community Review. Comment on the current draft and the preliminary proposal are also welcome, and may be provided through the [VLASS Working Group online forums](#) (<https://science.nrao.edu/science/surveys/vlass/vlass-discussion-forums>). Note that if the VLASS proposal is approved, observing will start no earlier than Spring 2016.

## ALMA Project Status

Al Wootten



### Recent Commissioning Successes

The ALMA Extension of Capabilities team has achieved a number of remarkable goals recently. Weather at Chajnantor has been very good, as is usual for the austral winter. The excellent atmospheric transparency has benefitted the ALMA high frequency campaign, which closed as the long baseline campaign began.

As previously planned, Early Science has been suspended until December as key capabilities are readied for the

ALMA Cycle 3 Call for Proposals, which will occur in austral summer 2015. A high frequency campaign, aimed toward testing ALMA Band 10 (315-380 microns), the highest frequency ALMA band, resulted in an 860 GHz image of Uranus using 29 array elements with a resolution of 0.18 arcsec. Among the goals of the high frequency campaign was the demonstration of sub-arraying capability with ALMA, which was achieved with four sub-arrays of five antennas in early August. Band-to-band transfer of phase from lower to higher frequencies was also demonstrated.

The 12-m Array has moved to an extended configuration for enabling tests on baselines of up to 10.9 km. This exercise included the first moves of antennas to distant stations, at times involving two re-positionings in a day. This “Y+12” configuration features 12 antennas spread across the plateau and is designed to test phase stability and phase transfer between frequencies. Excellent results were demonstrated with baselines of many kilometers at frequencies as high as 860 GHz (Band 10). Imaging testing will proceed in October with other array elements, and the campaign will continue commissioning type observations through November. This is a critical commissioning campaign that is essential for Cycle 3 proposed capabilities and will test the ALMA calibration and imaging characteristics out to baselines of at least 10km.

### **New Science Verification Data**

A new installment of Science Verification data is available at the [ALMA Science Portal \(http://almascience.nrao.edu\)](http://almascience.nrao.edu). This release contains two new datasets:

- VY CMa: water masers at Bands 7 and 9, demonstrating the 1-3 km baseline capability.
- Comet Lemmon: the HCN line in Band 6, demonstrating the Doppler tracking of ephemeris targets.

### **ALMA Pipeline**

ALMA Cycle 2 Early Science began 3 June, and nine weeklong blocks have now been completed. The ALMA pipeline became the principal means of data calibration and flagging for PI projects on 17 September. As ALMA investigators know, until now all ALMA data have been reduced manually by our team of scientists around the globe. For North American projects, the data are reduced by staff scientists at the North American ALMA Science Center (NAASC) at NRAO Headquarters in Charlottesville and in Victoria, Canada, and at the Joint ALMA Observatory in Santiago, Chile.

A dedicated team of engineers and scientists has been developing the automated pipeline to handle the majority of projects. Some non-standard cases will continue to require manual reduction. The pipeline currently handles flagging and calibration while the imaging step continues to be done manually. An imaging pipeline is also under development. The pipeline will ensure timely flow of ALMA's transformational results to its investigators, and to the attention of the world at large. The pipeline team can be proud of their accomplishments.

### **2014 ALMA Science Conference**

More than two hundred astronomers have registered for the ALMA science conference [Revolution in Astronomy with ALMA – The Third Year, \(http://www.almasc2014.jp\)](http://www.almasc2014.jp) which will take place 8-11 December 2014 at the Tokyo International Forum in Tokyo, Japan. A total of 146 abstracts have been received for oral presentations and are being reviewed by the Science Organizing Committee for possible inclusion in the program. A preliminary science program will be posted to the [conference website \(http://www.almasc2014.jp\)](http://www.almasc2014.jp) by 1 October. Poster submissions will be accepted through 15 October, which is also the deadline for registration and payment. We hope to see you in Tokyo!

## Text Messages & Your GBT Project Schedule

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Toney Minter and Karen O'Neil



Did you know you could receive text messages from the Green Bank Telescope (GBT) Dynamic Scheduling System (DSS) anytime one of your projects is scheduled and a notice is sent out about your project? All cell phones have a designated email address that can be used to send an email that will be received as a text message by the cell phone. This email address is usually the phone number of the cell phone at a specific site address provided by the cell phone provider. You can determine the email address for your cell phone by contacting your provider or from [online lists](http://www.emailtextmessages.com/) (<http://www.emailtextmessages.com/>).

It is straightforward to receive notices from the GBT DSS on your cell phone. Log into your profile web page in the [NRAO Proposal Submission Tool \(PST\)](https://my.nrao.edu/) (<https://my.nrao.edu/>), click on the **Profile** tab, and then click the **add** button in the **Email addresses** section. Enter the email address of your cell phone and hit save. The DSS system will automatically send its emails to all email addresses you have registered in the PST.

Some providers limit the size of the text message you receive, truncating most of the scheduling email. The formatting of the emails may also be compromised during the conversion to a text message. However, the subject line of the email should still be useful as a notification to you of pending observations or notices.

Contact your cell phone provider to determine if you will incur any costs in receiving text messages from emails before you consider registering your cell phone number with the PST and DSS.

## The Hitchhiker's Guide to Extracting SEDs and Spectra from the Herschel Science Archive

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David Shupe (IPAC/Caltech)

Calling all radio astronomers: here is your chance to learn quickly, in the beautiful environs of Pasadena, California, how to extract far-infrared and sub-millimeter data from the Herschel archive for your favorite sample of radio continuum or ALMA targets!

In its 3.5 years of operation, ESA's Herschel Space Observatory made over 40,000 observations in the far infrared and submillimeter, encompassing photometry and spectroscopy of stars, galaxies, the interstellar medium and bodies in our solar system. In this workshop, taking place 6-10 October on the Caltech campus in Pasadena, instrument scientists from the NASA Herschel Science Center will explain how to make use of Herschel's rich archive. The workshop features an Essentials track (mornings only) on manipulating and extracting science results from processed products, and a Master track (entire workshop) on reprocessing special cases and large datasets.

Registration closes 30 September. For more information, visit <https://nhscsci.ipac.caltech.edu> (<https://nhscsci.ipac.caltech.edu>) or email [nhscworkshop@ipac.caltech.edu](mailto:nhscworkshop@ipac.caltech.edu) (#).

## CASA 4.2.2 Released

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Juergen Ott & the CASA team

We are pleased to announce release 4.2.2 of the Common Astronomy Software Applications (CASA) package.



CASA is being developed by NRAO, ESO, and NAOJ and is used for the offline reduction and analysis of both ALMA and VLA data. CASA is fully scriptable. Full support is provided for ALMA and VLA but almost any data that can be written in uvfits format can be imported and reduced in CASA (for example, CARMA, SMA, ATCA).

CASA 4.2.2 is a patch release of CASA 4.2.0/4.2.1 to introduce SIGMA and WEIGHT columns defined according to channel width and integration time. The patch also adds the plotms capability to export iterated plots in multiple files.

CASA 4.2.2 is now available from the [CASA homepage \(http://casa.nrao.edu\)](http://casa.nrao.edu). Please follow the links to "Obtaining CASA".

Supported OSs include:

- Linux (64bit): RedHat 5.7 & 6.4
- Mac OS: 10.8 (Mountain Lion)

At this point, we have not fully tested and updated CASA to work on Mac OS 10.9 systems. The usage of CASA 4.2.2 on this platform is considered to be experimental but we plan to have 10.9 support for the upcoming CASA 4.3 release. Due to unforeseen hardware failures, we are also unable to support MacOS 10.7 anymore. This patch release is thus for Linux and MacOS 10.8 only.

We encourage you to subscribe to either or both of the following subscription lists:

**Casa-announce** for announcement of new releases, workshops, etc.; [subscribe here \(http://listmgr.cv.nrao.edu/mailman/listinfo/casa-announce\)](http://listmgr.cv.nrao.edu/mailman/listinfo/casa-announce).

**Casa-users** for critical bugs and code updates; [subscribe here \(http://listmgr.cv.nrao.edu/mailman/listinfo/casa-users\)](http://listmgr.cv.nrao.edu/mailman/listinfo/casa-users).

If you have any questions, please consult the [NRAO helpdesk \(http://help.nrao.edu\)](http://help.nrao.edu) for all VLA-VLBA-GBT questions or the [ALMA helpdesk \(http://help.almascience.org\)](http://help.almascience.org) for all ALMA related questions. CASA also supports an [online discussion forum \(https://science.nrao.edu/forums\)](https://science.nrao.edu/forums).

## Recent Media Releases

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[Infant Solar System Shows Signs of Windy Weather \(https://public.nrao.edu/news/pressreleases/t-tauri-alma\)](https://public.nrao.edu/news/pressreleases/t-tauri-alma)

22 Sep 2014



[Galaxy Mergers Defy Expectations to Produce Disk Galaxies \(https://public.nrao.edu/news/pressreleases/mergers-disks-alma\)](https://public.nrao.edu/news/pressreleases/mergers-disks-alma)

16 Sep 2014



[Newly Identified Galactic Supercluster Is Home to the Milky Way \(https://public.nrao.edu/news/pressreleases/supercluster-gbt\)](https://public.nrao.edu/news/pressreleases/supercluster-gbt)

03 Sep 2014



**[SETI, Astrobiology Pioneer Awarded Jansky Lectureship](https://public.nrao.edu/news/pressreleases/2014-jansky-lecture)**  
(<https://public.nrao.edu/news/pressreleases/2014-jansky-lecture>)

**02 Sep 2014**



**[Radio Telescopes Settle Controversy Over Distance to Pleiades](https://public.nrao.edu/news/pressreleases/radio-telescopes-settle-controversy)**  
(<https://public.nrao.edu/news/pressreleases/radio-telescopes-settle-controversy>)

**28 Aug 2014**



**[Orion Rocks! Pebble-size Particles May Kick Start Planet Formation](https://public.nrao.edu/news/pressreleases/dust-grains-orion)**  
(<https://public.nrao.edu/news/pressreleases/dust-grains-orion>)

**27 Aug 2014**



**[Best View Yet of Merging Galaxies in Distant Universe](https://public.nrao.edu/news/pressreleases/ancient-merging-galaxies)**  
(<https://public.nrao.edu/news/pressreleases/ancient-merging-galaxies>)

**26 Aug 2014**

## Career Opportunities

### New Postings

**[ALMA Operations Astronomer:](https://cw.halogensoftware.com/nrao/loadJobPostingDetails.do?jobPostingID=100540&source=jobList)** (<https://cw.halogensoftware.com/nrao/loadJobPostingDetails.do?jobPostingID=100540&source=jobList>) The NRAO in Santiago, Chile is now accepting applications for an Operations Astronomer position. Successful candidates will work in the ALMA Program Management Group within the Joint ALMA Observatory Department of Science Operations, is responsible for ALMA observations. It consists of three groups: the Array Operations Group, the Program Management Group (PMG) and the Data Management Group (DMG). The PMG is responsible for scheduling and tracking of projects as well as data processing and data quality assurance.

**[Scientific Associate \(Data Analyst\):](https://cw.halogensoftware.com/nrao/loadJobPostingDetails.do?jobPostingID=100580&source=jobList)** (<https://cw.halogensoftware.com/nrao/loadJobPostingDetails.do?jobPostingID=100580&source=jobList>) The NRAO in Charlottesville, VA is now accepting applications for a Data Analyst position. The primary goal of the Data Analyst will be to provide assistance to observatory users by reducing data and assessing data quality, operating a data reduction pipeline, answering questions in the online helpdesk system, assisting with observing script preparation, testing observatory software, and contributing to the data delivery process.

**[Human Resources Manager:](https://cw.halogensoftware.com/nrao/loadJobPostingDetails.do?jobPostingID=100461&source=jobList)** (<https://cw.halogensoftware.com/nrao/loadJobPostingDetails.do?jobPostingID=100461&source=jobList>) The NRAO in Santiago, Chile is now accepting applications for a Human Resources Manager. The Human Resources Manager is an international, key management position within the Joint ALMA Observatory and she/he will report to the ALMA Director. She/he is the coordinator of all staff HR activities and as such has a dotted line connection with the Executives. As a member of the ALMA Human Resources Advisory Group and acting as its Chair, she/he organizes meetings, prepares agendas and makes presentations to the group.

**[Systems Administrator II](https://cw.halogensoftware.com/nrao/loadJobPostingDetails.do?jobPostingID=100500&source=jobList)** (<https://cw.halogensoftware.com/nrao/loadJobPostingDetails.do?jobPostingID=100500&source=jobList>): The NRAO in Socorro, NM is now accepting applications for a Systems Administrator position. Under the guidance of the SIS HPC group lead this position will work with local technical and scientific staff to improve the state of local and remote Linux cluster based parallel processing.

Duties will include assisting with implementation of automated routine benchmarking of standard NRAO analysis packages, assisting in the creation of archive, cluster, Lustre file system and Wide Area Network (WAN) monitoring and scheduling tools, and the creation of user documentation.

**Scientist** (<https://cw.halogensoftware.com/nrao/loadJobPostingDetails.do?jobPostingID=100402&source=jobList>) :

The NRAO in Green Bank, West Virginia is now accepting applications for a Scientist position. Responsibilities of the successful applicant(s) will include supporting observers who use the telescope as well as working on a diverse variety of projects, which may include the development and commissioning of new instrumentation on the telescope, working with the engineering staff to improve the overall telescope performance, and aiding with the data reduction pipelines needed for the GBT.

**Software Build and Test Engineer** (<https://cw.halogensoftware.com/nrao/loadJobPostingDetails.do?jobPostingID=100320&source=jobList>) :

The NRAO is now accepting applications for a Software Build and Test Engineer. This position may be located in Socorro, NM or Charlottesville, VA. The Software Engineer will be a member of the Common Astronomy Software Applications (CASA) development team. The new team member will primarily be responsible for CASA builds, build support and release packaging. As part of these duties, the Software Engineer will participate in extending the current build system (currently based on Cmake) and the existing automated test system (currently based on Jenkins and Robot Framework).

**Electronics Engineer II** (<https://cw.halogensoftware.com/nrao/loadJobPostingDetails.do?jobPostingID=100401&source=jobList>) :

The NRAO in Green Bank, West Virginia is now accepting applications for an Electronics Engineer position. Using prescribed methods, researches, conducts or coordinates detailed phases of digital system engineering work as assigned. The candidate will perform work that involves conventional engineering practices and will also be a part of Green Bank's Electronics Division, which oversees all electronics engineering related activities for Robert C. Byrd Green Bank Telescope (GBT).

**Software Engineer II (441)**: (<https://cw.halogensoftware.com/nrao/loadJobPostingDetails.do?jobPostingID=100340&source=jobList>)

The NRAO is now accepting applications for a Software Engineer II position. Collaboratively with other NRAO staff, evaluate, deploy, maintain, and write web applications for the North American ALMA Science Center (NAASC) user portal, and support the configuration and operation of the NRAO Science helpdesk. This will require leveraging of existing NRAO web services and content, development of ALMA (Atacama Large Millimeter/Submillimeter Array) and NRAO web service prototypes, and new technologies.

**Software Engineer II (262)**: (<https://cw.halogensoftware.com/nrao/loadJobPostingDetails.do?jobPostingID=100220&source=jobList>)

The NRAO in Charlottesville, VA is now accepting applications for a Software Engineer II position. The successful applicant will work with CASA (Common Astronomy Software Applications) developers, project scientists, and stakeholders to design and implement a comprehensive test program. Duties will include assuming responsibility for existing test systems, improvement of existing tests, and evaluation of test coverage for new capabilities.

## From the Archives

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Ellen Bouton

**About this month's photograph:** The search for a site for the Very Large Array (VLA) began in the mid-1960s with visits by members of the VLA Project team to a number of potential locations in the southwestern



US. This photo was taken in February 1966 on the Plains of St. Augustin, in the general area of the future intersection of the array arms. Cam Wade is on the left and Max Small is on the right, both from NRAO. In the center is Robert Weber, a geologist with the New Mexico Bureau of Mines in Socorro, who was very knowledgeable about the geology of the Plains of San Augustin and was hugely helpful to the VLA project. Around his neck, Wade has the Finnish forester's compass that he used to check out all the potential VLA sites, and to do the initial layout for the array. Cam Wade provided the caption information; he reports that the photo was probably

taken by George Swenson using Max Small's camera. [Robyn Harrison's 2003 interview with Wade](http://www.nrao.edu/archives/Wade/harrison_transcript_wade_2003.shtml) ([http://www.nrao.edu/archives/Wade/harrison\\_transcript\\_wade\\_2003.shtml](http://www.nrao.edu/archives/Wade/harrison_transcript_wade_2003.shtml)), available in the NRAO Archives, in which Wade describes the very early years of the VLA Project, includes his account of the development of the concept and the efforts to procure the site.

**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, [archivist@nrao.edu](mailto:archivist@nrao.edu) (#).

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Contact the Editor ([mailto:mtadams@nrao.edu?subject=NRAO eNews Editor](mailto:mtadams@nrao.edu?subject=NRAO%20eNews%20Editor))



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