

NOV 07 2002

Vol. 6 No. 6

November 1, 2002

NATIONAL RADIO ASTRONOMY OBSERVATORY
CHARLOTTESVILLE, VA

VLA/VLBA NEWSLETTER

WEATHER STATS		
	HIGH	LOW
Sept.	85.4° (5th)	34.9° (20th)
Oct.	74.9° (6th)	18.9° (30th)
Total Precipitation: 1.93"/.11"		

From the World's Premier Centimeter Wave Radio Synthesis Telescopes

AROUND THE VLA

Welcome aboard Ray Valenzuela and Elias Jojola, Grounds Crew; David Midgett, VLA Operations; and Robert Walker, Guard.

NOTES FROM THE A.D.

In mid-October, it was announced that Riccardo Giacconi was awarded the Nobel Prize for Physics. Dr. Giacconi is the President of Associated Universities, Inc., which operates NRAO under a cooperative agreement with the National Science Foundation. The Nobel Prize was awarded for one of Dr. Giacconi's earliest scientific contributions, essentially the invention of X-ray astronomy and the discovery of cosmic X-ray sources.

The X rays from celestial sources are absorbed by the Earth's atmosphere, and can only be detected by rocket, balloon, or satellite flights that go above the atmosphere. In the early 1960s, Dr. Giacconi was the pioneer in development and flight of the rocket that detected the first X-ray sources outside our solar system, and he also was instrumental in the development of succeeding generations of rocket and satellite instrumentation. NRAO and Associated Universities are happy to be associated with Dr. Giacconi, and we congratulate him on his well-deserved award.

We now are one month into a new fiscal year, which started on October 1. As most of you probably know, passage of the final budget for the National Science Foundation is stalled in Congress, along with most of the appropriations for the federal government. Since we are not likely to know the final budget for NRAO for several months, until well into the 2003 calendar year, prudence requires that we watch our spending carefully in the meantime.

Purchases for ongoing operations largely will be restricted to those we need to keep the arrays and their infrastructure in good operational order rather than for new capabilities. The EVLA will

restrict its spending to the purchases needed to meet its two major milestones of installing the fiber cable on the VLA site and equipping the first EVLA test antenna in the spring.

There will be an all-hands meeting at the VLA site on November 7, at 1:00 p.m. (9:30 a.m. in the AOC). Agenda items will include a presentation of the status of the EVLA project, discussion of issues regarding available work space, and response to some concerns raised by the employee committee. Please come prepared with questions on these or any other issues of interest.

J. Ulvestad

THOSE TACKY TACHS

The servo systems on all the VLA and VLBA antennas use tachometers (tachs) for speed control. These tachs are the biggest reliability problem with the VLBA servo system. With each failure the tach must be replaced for about \$450. Additionally, typically a tach failure will blow several expensive drive cabinet fuses and require a late night site tech visit.

The failures are caused by forces exerted on the tach bearings by the drive motor. Either the bearing fails completely and ruins the tach armature or the bearing gets so sloppy that the tach signal gets noisy. The VLBA tachs suffer more failures than the VLA tachs for two reasons: the motors spin much faster and the servo electronics are much more sensitive.

A few years ago Doug Whiton developed electronics to use digital tachs. A digital tach can use non contact methods to read the speed of the motor. This would eliminate one half of the tach failures. We have been experimenting with commercial digital tachs to mate to Doug's electronics, but mounting them to the VLBA motors and the inadequate bearings have been very problematic.

Last fiscal year the accelerating number of tach failures due to the age of the VLBA made

a significant impact on the servo budget. This prompted us to abandon the idea of using a commercial tach and develop our own. We now have a design that has no bearings or coupling, and uses non contact optical sensors instead of brushes. This avoids both failure modes of the old tachs.

In a week or two we will have prototypes for testing on a VLBA antenna. The new tachs will cost less than \$100 each and last many times longer than the \$450 tachs we use now. They are very easy to install, require no adjustments, exceed all specifications of the old tachs, and are fully sealed. Hopefully, they will work!

B. Broilo

SITE & WYE NEWS

The Grounds Crew has increased in size. Joe Sanchez transferred from Track to Grounds; Carl Cano, Jay Apachito and Richard Torres were reclassified from Temporary Full Time to Regular Full Time; and two new employees, Ray Valenzuela and Elias Jojola, complete the crew. Preliminary work on fiber optic cable installation has begun.

The Track Crew has replaced approximately 4000 ties this season and are in the process of tamping them. There is one addition to the crew, Wade Dixon. He filled the position vacated by Joe Sanchez. Wade was reclassified from TFT to RFT. EVLA has kept everyone busy. The Track Crew had to remove trackage for the fiber optic cable installation. New employees from Grounds and Track are being scheduled for equipment operator schools at NMIMT.

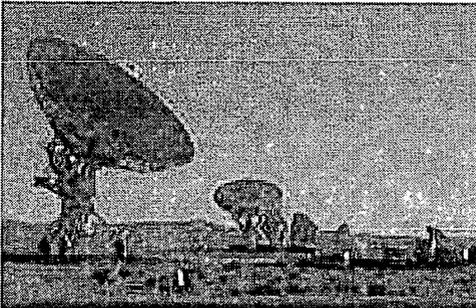
The Carpentry Shop has been busy building shipping crates, mock-ups and manhole roofs for fiber optic splice locations. The carpenters are also busy at the AOC with remodeling jobs.

The Auto Shop has been busy with the usual run of breakdowns and flats. They have also been outfitting the trailer to be used for the fiber optic cable installation. They installed the racks that the Welding Shop built, built and installed the cable windows (guides) and are in the process of installing a walkway with hand rails around the racks.

P. Lewis

SUBDIVIDING THE VLA

At least three times this year, in January, May, and September, people may have noticed that the individual VLA antennas were pointing in several different directions at the same time. In fact, the VLA was observing in its maximum number of five independent directions at once. The purpose was to observe a large number of small radio sources, looking for source strengths that change in times ranging from a few hours up to a day or two. Since the targets were very strong and compact, the VLA did not need many antennas to detect or image the sources, so five subarrays could be used to observe five times more radio sources.



VLA antennas pointing in several directions at once

Why would anyone want to make such an observation? The gas between the stars in our Galaxy can cause very small radio sources to twinkle, similar to the way that Earth's atmosphere causes stars to twinkle. Structures in this gas can move across our line of sight, affecting the transmission of the radio waves and causing variations of a few percent (or more) in the source brightness. The VLA is ideal for searching for these variations because of its high sensitivity, large number of antennas, and stable calibration.

It turns out that radio sources can twinkle only if they are very small, less than about 5 microarcseconds in angular size. This angle is about half the size of a dime seen at the distance of the Moon! It is more than 20 times smaller than the smallest size that can be resolved and imaged by the VLBA. In the first two sets of observations (January and May), about 150 radio

sources were newly discovered to vary in less than 2-3 days. This indicates that their radio emission comes from extremely small regions, no more than a few hundred times the size of the central black holes that fuel them.

So, next time you see the VLA subdivided into many different subarrays, just remember that it's probably being done on purpose for some important scientific reason, and is not just a mistake!

J. Ulvestad

EMPLOYEE COMMITTEE NEWS

Recent increases in the membership fees for the NMT swimming pool, gym, and the golf course led the Employee Committee to carry out a survey of the NRAO-NM staff in August in order to determine how much we use these facilities. Several respondents to the survey said they had discontinued membership of NMT recreational facilities as a result of the increased fees.

The NRAO subsidizes membership of the NMT swimming pool and the gym for all employees. The subsidy is the same for the NRAO employees in New Mexico as at other NRAO sites, while the fees charged by NMT are lower than those in Tucson and Charlottesville (however, the NMT facilities are also more limited than those available at the University of Arizona and the University of Virginia). Green Bank employees do not have access to local recreational facilities. So, although fees have increased recently, we do still have a good deal!

Gym membership can be purchased for periods of 1 month, 6 months, or a year at the following rates:

1 month individual/family = \$15/\$37.50
6 month individual/family = \$37.50/\$97.50
1 year individual/family = \$75/\$195

Pool membership:

1 year individual/family (including tax) = \$82/\$93.50

Golf membership:

1 year individual/family = \$440/836
Regular green fees = \$20

Please see Theresa McBride to pick up a form that you can take to the relevant NMT facility in order to have access to these reduced NRAO membership rates for the gym and the swimming pool. For more details about the survey results please contact Tom Baldwin.

The Employee Committee

NOVEMBER SKIES

This month, Saturn and Jupiter will take center stage during evening hours. Rising early in the evening, Saturn will be keeping company with the well-known constellations of Taurus, Orion and Gemini and will rival several nearby stars for brightness. For those of you with small telescopes, Saturn's rings will be at their maximum tilt offering a spectacular view of the ring system.

Jupiter follows Saturn, rising at about 11:30 p.m. By late November it will rise as early as 9:30 p.m. The best viewing of Jupiter will still be in the early morning hours. Venus reappears as the morning star and by the 9th will rise a full hour before sunrise.

This month the Moon will be new on the 4th, first-quarter on the 11th, full on the 19th and last quarter on the 27th.

The big show this month will be the Leonid meteor shower. Several "experts" have predicted that this year's display will be a "meteor storm" with levels of 1000 per hour or greater. This year there will be two peaks as the Earth encounters two debris trails left by comet 55P/Tempel-Tuttle.

The Earth will plough into the debris trail from the passage of 1767 at about 9 p.m. local time on November 18th. At 3:36 in the morning on November 19th comes the encounter with the 1866 trail. There will be a full moon, which will make meteors hard to see, but the good news is that the Leonids, because of their very high speed, are often very bright and easy to spot.

In any event, the Tech Astronomy Club and the Etscorn Campus Observatory will hold a "meteor storm party" beginning around 7:00 p.m. on the 18th and lasting until everybody goes home! Dress warmly, bring some goodies to eat and drink and join us for this spectacular show. The "experts" also tell us that this is likely to be the last "storm" for the Leonids for a very long time. So, wherever you are, try to find a good dark viewing site and enjoy the show.

In addition to the Leonid storm party, Etscorn Observatory has scheduled star parties for the evenings of November 9th, 15th, 16th, 19th and for the Festival of the Cranes on the 21st. All will begin around 7 p.m. and the public is invited to any of these events.

J. Spargo