



NAAPO (North American AstroPhysical Observatory)

"Signals"
Volume 5 Number 6
The NAAPO Newsletter
(December 1989)



Editor:
Jeff Goins
70 West Home
Street
Westerville,
Ohio 43081
(614) 891-3743

**NAAPO
Coordinator:**
Dr. Philip E.
Barnhart
Dept. of Physics/
Astronomy
Otterbein College
Westerville, Ohio
43081
614-898-1516

Kraus Awarded IEEE Heinrich Hertz Medal



Dr. Kraus

The IEEE Board of Directors has named JOHN D. KRAUS recipient of the 1990 Heinrich Hertz Medal for his ". . . pioneering work in radio astronomy and the development of the helical antenna and the corner reflector antenna." Dr. Kraus is the second recipient of this newest major medal of the IEEE. In 1985 the IEEE awarded Kraus its oldest major medal, named for Thomas Alva Edison. Earlier recipients of the Edison Medal include Alexander Graham Bell and George Westinghouse.

The Institute of Electrical and Electronics Engineers (IEEE) is one of the largest professional societies with over 300,000 members world-wide. The medal is named for the father of radio, AM, FM, and TV. The Heinrich Hertz Medal was established through the initiative of the European members of the IEEE with the first award made on the 100th anniversary of Heinrich Hertz's first demonstration of radio transmission in his laboratory at Karlsruhe University, Germany, about 1888.

The Heinrich Hertz Medal is awarded to an engineer or scientist, whether a member of the IEEE or not, who has made highly significant contributions furthering the use of Hertzian (radio) waves which have found wide application. Kraus' helical antenna is the workhorse of space communication and his corner reflector is used by the millions for TV reception.

Kraus, Director of the Radio Observatory with which NAAPO is affiliated, is McDougal Professor (Emeritus) of Electrical Engineering at the Ohio State University where he has been a faculty member since 1946. He is also a noted author of textbooks in Radio Astronomy, Antenna Theory and Design and electromagnetism.

The Heinrich Hertz award consists of a gold medal, a citation and a \$10,000 honorarium. The medal presentation will occur at the IEEE International Convention in Toronto Canada, in October 1990.

Task Progress Reports

[THINGS YOU'VE AWAITED FROM LAST SPRING WITH BATED BREATH]

1. OUTRIGGER WHEELS

Ang Campanella had drawn a set of plans for putting real wheels and real tires on the scissors arm. No one seemed to want to take on the task of fabricating the mounts and attaching the wheels so the project sat for a couple of months. Just before leaving for R & R in northern New Mexico – southern Colorado region, Barnhart picked up metal angle stock and tired wheels and parked them at the RO. Russ Childers, finding them in the way, proceeded to hack and hew them into a shape not too far from that proposed by Ang and mounted them on the pivot end of the scissors arm and the outrigger of the horn cart.

THEY WORK BEAUTIFULLY!!!! The cart moves easily and with little digging in on the asphalt surface of the ground plane. This has been a job WELL DONE!!!

2. SIGNAL SQUIRTER MOUNTING SCHEME

Bill Lonc at St. Mary's built a 1450 MHz signal generator and a transmitter to be used as a calibration source for telescope and receiver calibration. The plan is to mount it in a weather-proof enclosure at the base of the parabola and at appropriate intervals turn it on, probably in synchronism with the Dicke switch to provide a calibration signal for the whole system — from the horns through the final analyzer stages.

Hand held tests using the signal squirter have indicated its usefulness, so Gordon McIntosh and Alex Schaefer dug into the cable conduit under the ground plane from the focus room to the base of the paraboloid, removed a cable that had been there for over twenty years and installed a multi-conductor, shielded cable obtained from the Foster Grant inventory. Work needing attention on this task is design and construction of the thermal enclosure, design and construction of the beating circuitry and design and construction of the control and synchronous circuitry for transmission of the calibration signal.

**From *Physics Today*, p. 46, December 1989
by Irwin Goodwin**

Grants to principal investigators from the National Science Foundation, the primary patron for ground-based research, have not risen at all, after inflation is taken into account, since 1984 and the agency's support for both optical and radiowave observatories has actually dropped in those years. In consequence, research proposals have been turned down, technicians have been laid off, observatory maintenance has been postponed, and viewing time has been curtailed. What's more, construction of the Very Long Baseline Array has been stretched out and upgrading of the Arecibo radio-telescope in Puerto Rico has been put off.

Astronomers are painfully aware that telescope upgrades and wholly new facilities may depend on closing old instruments. When an NSF panel, under Donald Langenberg, chancellor of the University of Illinois at Chicago, examined the foundation's radiotelescopes last year and ranked three of them in the lowest of three categories, suggesting that they may have outlived their usefulness, the protests were as explosive as the Crab Nebula. The three were the 120-ft Haystack radiotelescope in Massachusetts, the 40-m Owens Valley facility in California and the 300-ft Green Bank dish, which collapsed in a heap last year but will be rebuilt to a new design. "Shutting down telescopes is not a pleasant prospect," Arthur B. C. Walker Jr of Stanford told NSF's Astronomy Advisory Committee, which he chairs, last 22 October. At the same meeting, Paul A. Vanden Bout, who heads the National Radio Astronomy Observatories, admitted: "As the funds shrink we spend less time doing science and more time scrapping over the bones."

Needed: plans and priorities

Bahcall wants astronomers and astrophysicists to debate their scientific plans and priorities at the AAS meeting. In addition, he wants to hear from particle physicists who are cultivating a relatively new field at the frontier between high-energy astrophysics, cosmology and particles. Indeed, high-energy physicists are likely to have thoughts about observing and analyzing extra-solar x-ray and gamma-ray phenomena. The decision to form a panel on particles, which had not been part of previous surveys, came about with detection of neutrinos from beyond the sun and from supernova 1987A, as well as evidence of powerful acceleration mechanisms in compact systems, the theory that dark matter is made of non-baryonic particles and the suggestion that quantum fluctuation and topological singularities contribute to

forming large-scale structures in the universe.

The 15 panels in the survey fall into three groups: eight dealing with disciplines or wave-lengths; a panel on planetary science; another on solar science, and five on a variety of subjects, such as national benefits from astronomy, computational work and policy issues. One of the central questions for the policy panel is: How can we get more astronomy for a fixed number of dollars? The benefits panel is being asked: "What practical applications can the nation expect from astronomy?" When the report appears two years from now, the chapter on benefits is likely to be most closely read by members of Congress and the Bush Administration, Bahcall observes. "We must make a powerful case," he says, "that astronomy and astrophysics are important to fund in an era of relatively stable scientific budgets."

LETTERS

Dear Dr. Bamhart:

I have not received *Signals* for months now. I had hoped the delay was the result of the summer doldrums and in the fall the NAAPO Newsletter would start again. Did you lose your mailing list in the computer, have you stopped publishing, or is a subscription required now?

One of the big events every month (or whenever it appeared) was the arrival of *Signals*. I especially like the Meeting and Radobs Notes as they gave me a sense of participation, even though I could not be in Westerville, Ohio and part of your group.

Hoping you're still publishing,

Russ Steele
Nevada City, CA

Yes Russ, there is a NAAPO.

Keep your eyes on future issues of Signals for really big news.

-PEB-

Coordinator's Corner

When it happens I get the feeling that I don't want to take the bromo because I won't be able to stand the noise. I woke up this fall to discover we have not published Signals for several months. Indeed, it took some gentle prodding from some of you to awaken me to the fact, (see the Letters section.)

It is always a shame that our best supporters are the ones deprived of the thrills attendant upon the great developments that arise in times of great ferment. The past several months have seen some the most exciting, progressive developments at the radio observatory in recent years. A quick scan of this issue will reveal indications of a variety of activities bordering on the miraculous.

I personally want to recognize your patience, but most of all, thank you for prodding me to get the newsletter back on track. I have felt the need all along, but found the time and energy lacking when the chips finally came into my hands.

I hope this issue stirs the Friends of Big Ear to see how much of their interest and support really means to our cause. We are on line in our mission to save, operate and maintain the high quality instrument that we have at our disposal. My heartfelt commendations go to all the volunteers and supporters of the project. It is great to see all the things being done to keep operations moving. We need everyone — whether you work directly on the tasks at hand, contribute money or just give us the indication you are behind us in spirit and intent.

-Peb-

Working Session Notes

18 November 89

The meeting came to order (?) at roughly 10 a.m. Those present were: (in no particular order) Dr. Barnhart, Dr. Dixon, Russ Childers, Shamim Ahmed, Ali Vardag, Jeff Goins, Aric Tucker, Steve Brown, Rodney Ferryman, Ang Campanella, The Jones school group, and Earl Phillips.

The Jones school group came to inform us that they are ready, willing and able to begin their volunteer effort for the RO. Their assistance will be greatly needed in

many areas, including raking, taking pictures, building maintenance, etc. They are quite willing to help out, and we welcome them aboard.

Dr. Dixon reports that there has been a donation of a Vax, which is to be placed in Dreese. There is a possibility that it may be moved to Otterbein in the future, to be tied into the system at the focus room, or it may simply be cannibalized for parts for the existing system. OSU has made an agreement with DEC for all Vax software, including operating systems, utilities, etc, at extremely low prices, so there is a strong possibility that the newly-donated machine will be operational. Dr. Dixon goes on to say that there will be a group here from NASA around 4 December to perform RFI measurements at the RO office building, in order to get an idea of the RFI situation inherent to the scope.

There was an article in the Delaware newspaper mentioning that the Air Force wants to construct an antenna tower as part of their ground-wave communications network, and will be holding meetings to inform the public of their plans, and to gather any feedback from anyone that may be impacted by this tower. Dr. Dixon will be attending these meetings, and will keep us informed as to any news.

Rodney Ferryman reports that he is still working on the A/D conversion software, and feels that it may soon be ready for testing.

Steve Brown reports that he is still wrestling with the chart recorder, and thinks that he may have it functioning correctly now.

Shamim reports that he is still working on the LNA's and will keep us updated as to any progress ... he also reports that he will have the RFI system functional soon, as there are now only two problems he has to iron out; a software difficulty that he and Rodney planned to have solved after today's meeting, and the LNA system.

Dr. Barnhart reports that there is currently \$1100.00 in petty cash, and that a donation of \$400.00 has been received for some of the shelving provided in the Foster grant.

At this point, the meeting was adjourned with almost everyone going off to perform their respective tasks.

2 December 89

ATTENDING: Dr. Barnhart, Dr. Dixon, Dr. Mitchell, Russ Childers, Steve Janis, Steve Brown, Steve Gibson, Rodney Ferryman, Dave Jurgens, Emmet Riordan, Tom VanHorne, Aric Tucker, John Liesenfeld and father (from the Jones school group), Richard Mathews, Earl Phillips, and Bob Cloon, an inclinometer specialist invited by Tom VanHorne to give us an education in inclinometers.

Dr. Dixon reports that Earl Jackson will be here Monday to get to work on installing the RFI measurement system on Tuesday. He will be here for about a week for the set-up, then will leave the system running for roughly a month. On about the third week in January, Jill Tarter of NASA will be paying us a visit for four to five days.

Earl Phillips reports that he will hopefully be finishing the esthetic work on the interior of the RO office building, so that it is slightly more presentable. He is currently asking for volunteers to assist in painting.

Steve Brown reports that he is still working on various equipment. He has received a frequency counter, and is currently attempting to hook it up to the sidereal clock.

There has been another donation of a PDP to the RO, and discussion centered on what to do with the sudden influx of computers, as there was also a donation of an 11/70 from the ESL folks.

Dr. Dixon handed out prints from the pictures he took of the group picnic at Dr. Barnhart's. I must say that we do look like a rather somber bunch, even with the Yo-Yo's!

The meeting was adjourned after an informative presentation and Q&A session regarding inclinometers, and we thank Bob very much for taking time out from his busy schedule to share some knowledge with us. Everyone filtered out to their respective tasks afterward.

16 December 89

Meeting started at 10 a.m. Those present were: Barnhart, Dixon, Campanella, Phillips, Brown, Aric and Toby Tucker, VanHorne, Goins, Janis and Ferryman.

Barnhart reports that Mr. Cloon has yet to contact him regarding the inclinometers we are to test before purchase. He feels that we may not have them for a small time yet, and we will be informed as to any progress.

Dixon reports that he and Dr. Kraus, along with the ESL people and others at OSU met to discuss what OSU intends to do with regard to the NASA visit. There is a general feeling of cooperation coming from all sides. Additionally, ESL reports that they have designed additions to the feed horns that will reduce the RFI being received. The costs are projected to \$2K to build and install them. Dixon will see about obtaining funding for this much needed improvement.

Other developments regarding the NASA visits are: Earl Jackson arrived and his equipment has been set up. There is a scaffolding erected to raise the discone RFI antenna above the roof of the RO office building, and the computers and other equipment are in the equipment room of the building. This is the start of a data-taking run that will determine the RFI in the area. Later measurements will be at the focus of the scope, to determine the RFUI drop there. It has been found that there is a large amount of RFI caused by local cellular phone traffic. This, among other sources of RFI had been searched out by Earl Phillips in his summer-long search of possible RFI causes. Copies of his findings are available to anyone interested.

Rodney Ferryman reports that he has completed the software program to run the SETI search! Rodney deserves a big round of applause for all the work he's put into the development of this software.

Steve Janis brought along copies of the Ohio State catalogue of source lists and publications for those interested in purchasing any of the items.

The meeting ended at roughly 12:30 p.m. with a few of those present filtering off to their respective tasks.

-EP-

New Galaxy Discovered

Riccardo Giovanelli and Martha Haynes recently made an interesting, serendipitous discovery. An at first sight spurious 21 cm line was detected at a velocity of 1300 km s⁻¹ in a region devoid of galaxies. Further inspections and follow-up observations revealed the feature to be associated with a rather extended, isolated cloud of gas. Its HI mass is about 5 x 10⁹ solar masses and the estimated total mass is about 3 times larger, as inferred from the surprisingly orderly rotation curve. The cloud has a diameter of 200 kpc and lies near the supergalactic plane. It appears to be a primordial cloud of gas still undergoing collapse, a unique example of a protogalaxy at $z = 0$.

Riccardo Giovanelli

Arecibo Observatory/NAIC Newsletter

Sept. 1989

Three Internships Established

In response to a general appeal for help in support of our visiting summer interns, Skip Lewis, long-time supporter and friend of the observatory, sent a check and a request to set up named internships. As I had indicated, we were in need of funds to support at least three potential interns this summer.

Dr. Lewis proposed calling the supported positions the John D. Kraus and Grote Reber Internships. It was agreed that this was a good idea and in light of the fact NAAPO was matching support for internships we call the third after another important pioneer of radio astronomy. Our third internship this summer was called the Karl Jansky Internship.

The first Reber Intern was ALEX SCHAEFER, a pre-engineering student at St. Vincent's College. ALEX came for three weeks with Kraus Intern GORDON McINTOSH. They spent a very productive time in terms of teaching us how to accommodate interns and get a maximum amount of useful activity to benefit them and us.

The Jansky Intern this summer performed a nearly superhuman task. JONATHAN PEARSON, a high school junior, mastered nearly all of the Foster inventory problems. He hauled, sorted, counted and recorded the whole thing.

We appreciate all these interns did for us during the summer and hope they were able to reap comparable benefits from their experiences with us.

-peb-

Future Working Session Schedule

6 January

20 January

3 February

17 February

3 March

17 March

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Designed by Jerry Ehman

Last modified: January 28, 2004