

Harvard-Smithsonian Center For Astrophysics R&G NEWSLETTER

VOLUME 1, NUMBER 5

September 1994

Contributing Editors: Jean Economos, Lincoln Greenhill, Judy Lees, Colin Masson, Jim Moran, Tom Mullen

NEWS FROM THE SMA by Colin Masson

A decade after its conception, the SAO Submillimeter Array (SMA) project is now solidly in its construction phase. The SMA will be an imaging interferometer with 6 antennas, each of 6m diameter, and will be located near the summit of Mauna Kea, HI. It will ultimately operate in the atmospheric windows between 180 GHz and 900 GHz, with 2 frequencies simultaneously available. The initial complement will be 3 receivers covering the 230 GHz, 345 GHz, and 690 GHz bands.

Each antenna will have a carbon-fiber reinforced plastic backup structure, with machined aluminum panels, all supported on a steel mount. The antennas were designed at SAO, and are being assembled at the SAO facility on the grounds of Haystack Observatory. The first 2 mounts are currently being assembled. After they are outfitted with motors and computer controls, the first pointing tests using an optical telescope will be completed in early 1995. The backup structure and panels will then be added to the first antenna, with holographic testing to be done in mid-year.

The antennas will be moved between the 4 configurations by a rubber-tired transporter, also designed at

SAO. The transporter is already operating, and has successfully moved the first mount around the Haystack site.

The other components are also proceeding well. The receiver system will use SIS mixers in a closed-cycle refrigerator and the prototype receivers have demonstrated world-beating performance in the lab. The local oscillator reference will be distributed over an optical fiber, using a novel cable wrap, with a total path stability of a few microns. The hybrid correlator will cover 2 GHz per receiver, and is being constructed jointly by Haystack Observatory and SAO. For the Haystack digital section, a new chip has been designed, with a total of 512 lags and a clock speed of 64 MHz.

We plan to assemble and test all components in Massachusetts before shipping them to Hawaii, to minimize mountaintop work. The groundbreaking at Mauna Kea is scheduled for May 1995, with first light for the SMA in 1997.

Check out our WWW server on <http://sma2/PAN-2.html> for some snapshots of Haystack and the transporter, as well as drawings of the antennas.

HAIL to:

Joao Alves	Star Formation II
Priscilla Benson	Star Formation I
Tyler Bourke	Star Formation I
Tamarleigh Grenfell	MM Wave Telescope
Shengtao Jiang	Precision Astronomy
Joseph Lehar	Astrometry
Laurent Loinard	MM Wave Telescope
Alexandre Loiseau	Precision Astronomy
Nagayoshi Ohashi	SMA
Nimesh Patel	SMA



and

FAREWELL

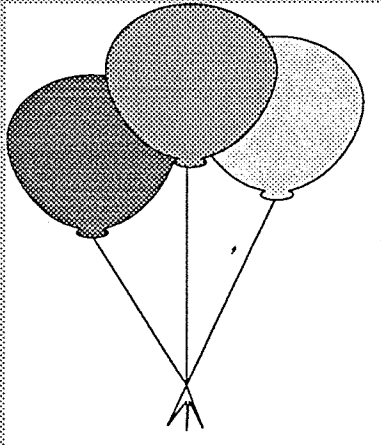
to:

Andrea Gilbert	VLBI II
Tamarleigh Grenfell	Star Formation II

Birthday Wishes

SEPTEMBER

Robert Babcock
Bob Calder
Lincoln Greenhill
Susanne Huttemeister
Enrico Lorenzini
Ed Mattison
Tom Mullen
Linda Williamson



OCTOBER

Merce Crosas
Tom Dame
Shengtao Jiang
Karl Menten
Luca Moseadelli
James Phillips
Matthias Rünitz
Irwin Shapiro
Zhiqiang Shen
Antony Stark
Edward Tong

UPCOMING

EVENTS

On Wednesday, 9/21, there will be a Hawaiian Luau at 5:00 PM at Perkin Lawn. This "end-of-summer BBQ" is presented by the CFA Social and Recreational Committee. Please contact Leslie Kenney at 5-7089 if you can do one or more of the following:

- * Bring food to share
- * Be a grill master
- * Help set up
- * Help clean up

GOT A



MESSAGE?

R&G staff (this means everyone in R&G; summer students, graduate students, visiting scientists, etc..) may place ads in our new edition to the newsletter, "R&G Message Center". Send specifics, your name and telephone numbers, to economos@cfa by September 30, 1994 for the October issue.

The following article appeared in the Sidereal Times, the daily newspaper of the XXIInd General Assembly of the IAU, The Hague 1994 on August 22, 1994. The title and conclusion was jazzed up by the editor, Seth Shostak!

Brobdignagian Beast in NGC 4258

by Jim Moran and Lincoln Greenhill

NGC 4258 (M106) is an active galaxy with anomalous radio arms, high velocity jets, and a curious nuclear water megamaser.

So, what's going on in the center of this galaxy?

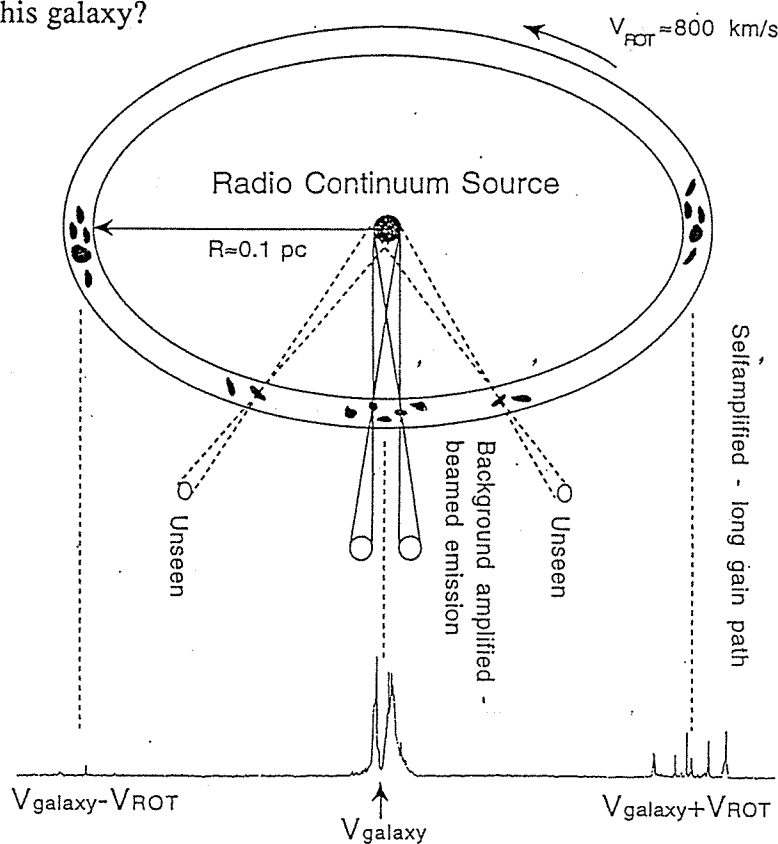
Study of the megamaser with VLBI has revealed a nuclear molecular ring only 0.1 pc in radius. Lincoln Greenhill reported today on behalf of his collaborators (Jiang, Moran, Reid, Claussen, Lo, Henkel, Becker, Wouterloot, and Wilson) in JD 5 the results of their study. Inspired by the recent discovery of maser emission extending in velocity over almost 2,000 km/s, they looked at the galaxy with an intercontinental array of radio telescopes.

They found an elongated structure with a well-defined velocity gradient of 8,000 km/s/pc in the maser features near velocity of the galaxy, clearly suggesting a Keplerian disk structure, as depicted in the figure. The disk radius and rotation of velocity of 800 km/s require a binding mass of 10^7 masses, with a mass

density of at least $2 \times 10^{10} M_{\odot} \text{pc}^{-3}$. The expected centripetal acceleration of the maser features is 7/km/s/yr as they drift in front of the central source, and has been confirmed by the observations at Haystack and Effelsberg.

The proper motions of the systemic maser features with respect to the high velocity maser features should be about 24 microarcseconds per year, for a distance of 7Mpc. This can be readily measured in observations spanning a few years with VLBI, and could provide an accurate measure of the distance to the galaxy.

Is this another massive black hole? The jury is still out, but the smart money says yes.



ADMINISTRATIVE NOTES
Federal Express Procedures by Tom Mullen

The Shipping and Receiving Department continues to receive invoices from Federal Express where employees have not included the fund number or the sender's name on the airbill. These invoices cannot be reconciled without this information. Before sending out a package, all the information on the Federal Express airbill must be filled out. To ensure R&Gers are not contributing to this problem, here are the R&G Fedex procedures to follow:

1. FOR FEDERAL FUNDS, GET THE FUND NUMBER FROM TOM OR JUDY OR CHARGE YOUR FEDEX PACKAGE TO YOUR CONTRACT AND GRANT FUND NUMBER. This number will go in the "sender references" box on the shipping manifest.
2. IF AT ALL POSSIBLE, PUT FEDEXES IN "OUTGOING MAIL" BEFORE THE AFTERNOON MAIL IS GONE. A Fedex Carrier picks up all Fedexes every business day at the Shipping Office at 4:30. If you put a Fedex in "outgoing mail" before the afternoon pick-up (3:00 or so) your Fedex will go out that day.
3. IF YOU SEND A FEDEX BY "INTERNAL MAIL", XEROX A COPY OF THE SHIPPING MANIFEST AND PLACE IT IN TOM'S MAILBOX OR PLACE A COPY IN INTEROFFICE MAIL TO TOM AT MS 42. Put the rest of the shipping manifest in the proper place on the envelope and put the Fedex Package in the "outgoing mail".
4. IF YOU HAVE TO SEND A FEDEX AFTER THE AFTERNOON "INTERNAL MAIL" HAS GONE, XEROX A COPY OF THE MANIFEST AND PLACE IT IN TOM'S MAILBOX OR PLACE A COPY IN INTEROFFICE MAIL TO TOM AT MS 42. Pull the pink copy and send it to shipping (MS 30). Drop the Fedex off in the drop box across the street before 6:00pm.
5. IF YOU NEED TO SEND A FEDEX AFTER 6:00, XEROX A COPY OF THE MANIFEST AND PLACE IT IN TOM'S MAILBOX OR PLACE A COPY IN INTEROFFICE MAIL TO TOM AT MS 42. Pull the pink copy and send it to Shipping (MS 30). Find a Fedex place and drop it off there.

PERSONNEL MATTERS
By Judy Lees

It is nice to be back after an eventful summer. I have one of the cutest babies that ever lived. I want to thank everyone for your kindness and concern. I also want to thank everyone who so generously donated leave. It was very helpful and much appreciated. Thank you!!

An administrative quickie: Jim Kenny is going to be available to R&Gers on a regular basis to answer your human resource questions and concerns. Beginning September 22, he is scheduled to be in the third floor conference room, M-340, at 160 Concord Avenue from 2-3:00 PM. He will be there (same time and place) every other Thursday through the end of the calendar year. The dates of his visits are as follows:

9/22, 10/6, 10/20, 11/3, 11/7, 12/1, 12/15, 12/29

Please take advantage of this opportunity.