



SearchLites

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The Quarterly Newsletter of The SETI League, Inc.

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Return to the Ashes

by H. Paul Shuch, Executive Director

When launched a year prior, the two-pronged NASA SETI study which Congress cancelled in 1993 had been slated to run ten years. Thus, it seemed a miracle of rebirth when California's SETI Institute launched its ambitious privatized search in 1994. Aptly dubbed Project Phoenix because it rose from the ashes of NASA SETI's demise, this targeted search continued for a decade, surveying all the sunlike stars within two hundred light years of Earth, from six great radio telescopes in Parkes and Mopra, Australia, Green Bank WV, Woodbury GA, Arecibo in Puerto Rico, and Jodrell Bank in the UK. Now that Project Phoenix has completed surveying the thousand nearest good suns (some would say better than NASA could have done the job), where does SETI go from here?

Not ones to rest on their laurels, the engineers and scientists at the SETI Institute are now directing their resources toward the design and construction of the world's most sensitive SETI instrument, the Allen Telescope Array. When it's completed, our California colleagues will no longer have to raise and spend millions renting time on big dishes around the world. In fact, researchers from numerous countries are already queuing up to rent telescope time from them! A few years' observational hiatus is a small price to pay for the birthing of so grand an instrument.

Does this mean that SETI observations are now at a standstill? Hardly! For there's still that other prong of the old NASA SETI plan, the all-sky survey. This is where The SETI League came in nine years ago, with our Project Argus global search. And we're just hitting our stride.

Unlike Project Phoenix, our Argus search does not target individual stars. Rather, it attempts to sweep out the entire sky, systematically, swath by swath. Unlike Phoenix, Argus does not need to spend millions on renting telescope time. Our members donate it, on their own homebuilt instruments. Unlike Project Phoenix, all-sky surveys such as our own do not restrict themselves to a search for our nearby neighbors; any sufficiently advanced galactic civilization is fair game. And, unlike Phoenix, our Argus search is not designed around a ten-year tenure. We're in it for the long haul, and will keep observing until we detect the evidence we seek.

And where might that evidence reside? One thing we've learned from Project Phoenix is that it's not likely to be in the local neighborhood. After ten years of targeted searching, they've covered rather well the known good suns that are close at hand. So we conclude that maybe technological civilizations are not quite so common as the SETI pioneers supposed a half-century ago. And if radio-polluting societies are a bit more rare than previously thought, it stands to reason that the distances between them are correspondingly great.

The targeted search was an ideal strategy, in a universe where life is common. But if life is somewhat more rare (as now seems the case), then the nearest inhabited system might not even appear on our star charts. The only way we're likely to encounter its emissions is by sweeping the whole sky. This is what targeted searches do. This is what Project Argus does. This is even what some of the dishes in the Allen Telescope Array may be tasked with doing, when that facility comes online.

So we deem Project Phoenix a success. True, in ten years it has produced not one single confirmed signal of intelligent extraterrestrial origin. But it's done its job, very thoroughly and very well. We now know where to concentrate our efforts: just where The SETI League has been focusing all along.

Is SETI returning to the ashes? Not at all. Our passion and prospects for interstellar contact have never burned brighter. ❖

Astronomy Picture of the Day Misleading

An image posted to the Internet as NASA's Astronomy Picture of the Day for 7 March 2004 was misleading, according to Dr. H. Paul Shuch, executive director of The SETI League, nonprofit leaders in the scientific Search for Extra-Terrestrial Intelligence. "The image itself is entirely genuine," Shuch explains, "and was a signal detection made by one of our members some five years ago, using his backyard radio telescope. We are pleased that NASA chose to feature this image on their APOD website. We only regret that their sensationalist caption may have mislead SETI supporters around the world."

The caption in question begins: "No one knows for sure what caused this signal. There is a slight possibility that it just might originate from an extraterrestrial intelligence."

"In fact," responds Shuch, "we have known exactly what caused this detection, ever since we posted it, along with a full explanation, to the 'What We've Heard So Far' page of our own website on 24 March 1999. We'd like it to be ET calling home. Unfortunately, the actual explanation is somewhat more mundane."

The signal in question was detected by SETI League member Gerald Cavan, on an amateur radio telescope at his home in Ontario, Canada. Cavan, a longtime amateur radio operator (callsign VE3EYR) is one of over 100 SETI League members around the world to operate his own radio telescope, as part of The SETI League's global Project Argus network.

The original image (only part of which was posted as the NASA Astronomy Picture of the Day) appears online at <http://www.setileague.org/photos/hits/cavan.jpg>. It is but one of dozens of signals a year analyzed by SETI League members since Project Argus went online on 21 April 1996. So far, not one of these detections has passed muster as a true manifestation of extraterrestrial intelligence. "But we are not discouraged," explains Shuch. "Before we can hope to detect messages from ET, we have to learn how to identify traces of mankind's own technology."

A technical description of the signal, provided by Cavan at the time of detection, and posted to The SETI League's website along with the original image, reads as follows: "The bottom is a hit first detected by SETIFOX on 1420.477 MHz, and repeated every day at the same RA 9:36:40 DEC 3:33:52 from this location EN92ux. The interesting thing about this hit is the fact that it displays none of the modulation I normally get from GPS qrm and that the Doppler is reversed. The top of the display is the GPS signal as received on 1575.4 MHz USB, after about one minute of this I switch back to the hit at 1420.477 to analyze the signal. The GPS signal gets up to S9+ on the R-7000 for the same time as the hit approx. 18 minutes, at this time the display goes back to just noise. I think the hit is caused by the strong GPS signal beating with some local signal (intermodulation)."

Subsequent collaborative analysis by multiple Project Argus participants confirmed Cavan's explanation. The SETI League publishes standardized detection and verification protocols, which specify the procedures to be followed in the event of a signal detection, in order to ensure scientific integrity and credibility.



Italian Engineer Wins SETI League's Bruno Award

Heppenheim, Germany., 27 March, 2004 -- The SETI League, Inc., grassroots leaders in the privatized Search for Extra-Terrestrial Intelligence, has awarded its highest technical honor to one of Europe's foremost radio astronomers. Stelio Montebugnoli, who heads the SETI Italia project from the Medicina radio telescopes in Italy, was honored today at EuroSETI04, The SETI League's first European SETI Science and Technology Workshop, with the annual Giordano Bruno Memorial Award, for significant contributions to SETI science.

Ing. Montebugnoli is an electronics engineer whose professional duties include the operation of the Northern Cross Radio Telescope at the Institute for Radio Astronomy, National Council of Research, near Bologna, Italy. For several years, he has conducted a parasitic SETI program from a 32-meter parabolic reflector which serves as part of the European Very Long Baseline Interferometer. Using six Project SERENDIP processor boards obtained from the University of California, Berkeley, his SETI Italia project monitors 24 million channels at a resolution of 0.6 Hz, making it one of the world's most sensitive tools in the Search for Extra-Terrestrial Intelligence.

The Bruno is awarded annually for significant technical contributions to the art and science of SETI. It is dedicated to the memory of Giordano Bruno, the Italian monk burned at the stake in 1600 for postulating the multiplicity of inhabited worlds. This award was first suggested by sociologist Donald Tarter, at a SETI dinner held at the American Association for the Advancement of Science meetings in Atlanta on Feb. 17, 1995 (coincidentally the 395th anniversary of Bruno's death).

Past recipients include physicist Dr. D. Kent Cullers, WA6TWX; software volunteer Daniel Boyd Fox, KF9ET; English amateur radio astronomers Trevor Unsworth, G0ECP, and Ken Chattenton, G4KIR; Australian coordinator Noel Cedric Welstead, VK4AYW; photonics engineer Dr. Stuart Kingsley; Peter Wright, DJ0BI, founder and president of the European Radio Astronomy Club; lunar farside radio astronomy proponent Dr. Claudio Maccone; and noted physicist, astronomer and SETI pioneer Prof. Philip Morrison, ex-W8FIS, jointly with his late wife, educator Phylis Morrison.

Event Horizon

May 28 - 31, 2004: *Balticon 38*, Baltimore MD.

June 28 - 30, 2004: *SARA Conference*, NRAO Green Bank WV.

July 12 - 16, 2004: *Bioastronomy 2004: Search for Habitable Worlds*, Reykjavik Iceland.

July 22 - 25, 2004: *Central States VHF Conference*, Mississauga, Ontario, Canada.

August 6 - 8, 2004: *SETICon 04* SETI League Technical Symposium and Annual Membership Meeting, in conjunction with the *11th International Ham Radio Moonbounce Conference*, The College of New Jersey, Ewing (Trenton area) NJ.

September 2 - 6, 2004: *Noreascon 4* World Science Fiction Convention, Boston MA.

October 4 - 8, 2004: *55th International Astronautical Congress*, Vancouver BC Canada.

October 14 - 16, 2004: *Microwave Update*, Dallas TX.

Special SETICon Section



Celebrating Ten Years of Privatized SETI

Preliminary SETICon04 Program

Friday, 6 August 2004:

Armstrong Hall, The College of New Jersey

- 8 AM – 2 PM Hardware Workshop (prereg. required)
- Noon - 2 PM Registration
- 2 PM – 2:30 PM Greetings and announcements
- 2:30 - 5:30 PM Technical Sessions
- 6 PM - 8 PM Dinner Break

AmeriSuites, Princeton NJ

- 8 PM - 11 PM Hospitality Suite

Saturday, 7 August 2004:

Armstrong Hall, The College of New Jersey

- 8 AM - Noon Registration
- 9 AM - Noon Technical Sessions
- Noon - 2 PM Lunch Break
- 2 PM - 5 PM Technical Sessions

Campus Center, The College of New Jersey

- 6 PM - 10 PM SETI League Awards Banquet

AmeriSuites, Princeton NJ

- 10 PM – Midnight Hospitality Suite

Sunday, 8 August 2004:

AmeriSuites, Princeton NJ

- 7 AM - 9 AM Volunteer Coordinators Breakfast

Armstrong Hall, The College of New Jersey

- 10 AM – Noon SETI League Annual Meeting
- Noon - 1 PM Board of Trustees Meeting

Awards Banquet

The SETI League's Third Annual Awards Banquet is scheduled for 6 - 10 PM Saturday night, 7 August 2004. Banquet tickets (at \$30 each) are available only in advance. The Banquet, to be held in the Campus Center at The College of New Jersey, will include a guest speaker and door prizes. It will culminate in the presentation of our two annual awards: the Giordano Bruno Memorial Award, The SETI League's highest technical honor, to an individual who has made significant contributions to the art and science of SETI, and the Orville N. Greene Service Award, honoring outstanding service to The SETI League.

Banquet tickets may be ordered at \$30 US per person, when pre-registering for the Conference by 30 June 2004. Dress code is conference casual. As banquet seating is limited, it is unlikely that additional banquet tickets will be available at the door.

Conference Proceedings

Don't miss out Proceedings of SETICon04, one copy of which is included in your registration fee. Additional copies may be purchased at the Symposium, for \$20.00 US apiece, along with a limited number of copies of the 2000 through 2003 Proceedings. SETICon04 presenters are reminded that a final camera-ready copy of your paper is due at SETI League headquarters by 31 May 2004.

Microwave Circuit Construction Workshop

SETICon offers an optional hands-on hardware workshop for those of our members who wish to learn more about constructing microwave circuitry. Under the expert guidance of experienced SETI League members, you will learn about component identification and microstrip assembly techniques, and then build and test your own Low Noise Amplifier.

The \$150 workshop fee (payable in advance) includes your quality LNA kit and all associated tools and components. Attendance is limited, and advance registration is required. Prerequisite: workshop participants must be able to figure out which end of the soldering iron is the handle!

Door Prizes Galore!

Through the kind support of several vendors, the door prize table at the first three SETI League Awards Banquets was filled to overflowing, and nobody went home empty-handed. We hope that present economic conditions will not deter our prize donors from being equally generous this year. Potential prize donors should contact SETI League executive director Dr. H. Paul Shuch at the earliest possible date. He may be reached by email to <drseti@setileague.org>. Prize donors will be acknowledged on The SETI League website, and in a future issue of *SearchLites*.

Annual Meeting Announcement

In accordance with Article IV, Section 1 of our duly approved Bylaws, as amended, the Trustees of The SETI League, Inc. hereby schedule our Tenth Annual Membership Meeting for 10 AM Eastern time on Sunday, 8 August 2004. The 2004 Annual Meeting will be preceded by a two-day SETI League Technical Symposium. Both events will be hosted by the Engineering Department of The College of New Jersey, Ewing Township (Trenton area) NJ.

As attendance by one percent of the League's membership constitutes a quorum, all members in good standing are encouraged to attend the Annual Meeting. The preliminary agenda for annual meetings appears in Article XII of The SETI League Bylaws, and is reproduced on our website.

Per Article IV, Section 3 of our Bylaws, as amended, written notice of this Meeting is being mailed to all members in good standing, not less than ten days nor more than ninety days prior to the meeting date. Members are encouraged to submit additional New Business items for inclusion in the Agenda. Please email proposed agenda items to n6tx@setileague.org, not later than **31 July 2004**.

The annual Board of Trustees Meeting required per Bylaws Article V, Section 3 will immediately follow the Membership Meeting. All SETI League members in good standing are welcome to attend. These meetings are open to all members without charge, and do *not* require Symposium registration.

Special SETICon Section



Celebrating Ten Years of Privatized SETI

Conference Venue

SETICon04 is being hosted by The College of New Jersey, Ewing NJ (adjacent to the city of Trenton). The Technical Symposium sessions, Annual Membership Meeting and Board of Trustees Meeting will all be held in the Department of Engineering, Armstrong Hall, 2000 Pennington Road, Ewing NJ 08628 USA. (Armstrong Hall is directly across from the college's Main Entrance from Route 31.) The Awards Banquet will be held in the Campus Center. Parking on campus is available in the lot and Armstrong Parking Garage, directly behind Armstrong Hall. Addition parking is available across the circular drive. All gates will be up in these parking areas, Friday through Sunday.

The evening Hospitality Suites, and possibly other Symposium social functions, will be held at the official Conference Hotel. See the accompanying maps, or The SETI League website, for details. ❖

Lodging

This year, we are changing hotels. Our official Conference Hotel is the **AmeriSuites West Windsor/ Princeton**, Carnegie Center West, 3565 US Route 1, Princeton NJ 08540 USA. (Princeton is about fifteen minutes North of The College of New Jersey campus, where SETICon04 technical sessions are being held.) Phone: (609) 720-0200. Fax: (609) 720-0201. Click [here](#) for a map and driving directions.

Evening Hospitality Suites and various other Symposium social functions will also be held at the AmeriSuites. The special group rate is \$95 plus tax for all types of rooms. The price includes breakfast, week-day newspaper, indoor heated pool, fitness center, 25 inch TV, free local transportation, rooms with mini-kitchen and refrigerator, coffee maker and coffee, etc. Within walking distance of the hotel there are several restaurants and a shopping center. Reservations must be made not later than **30 June 2004**, directly with the hotel. Be sure to mention "EME2004" (our sister conference his year) to secure the quoted room rate.

For those desiring lodgings closer to campus, alternatives in the Trenton, NJ area include:

| <u>Hotel</u> | <u>Telephone</u> |
|--------------|------------------|
| Hampton Inn | (215) 860-1700 |
| Red Roof Inn | (609) 896-3388 |
| Macintosh | (609) 896-3700 |
| Stage Depot | (609) 466-2000 |

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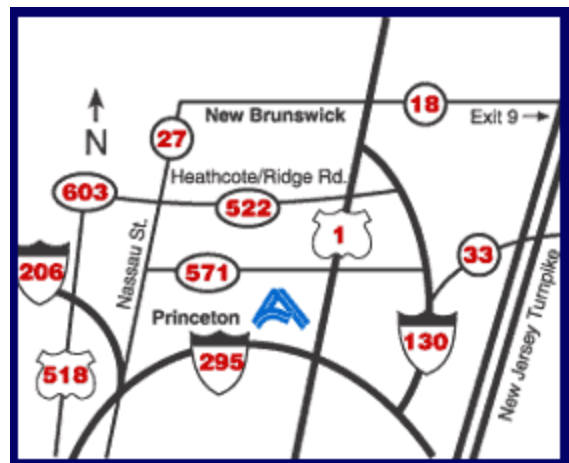
Transportation

SETICon04 is being held at The College of New Jersey, Ewing NJ (adjacent to the city of Trenton). Trenton NJ is located about forty miles Northeast of the Philadelphia International Airport, which is served by numerous domestic and international airlines. Driving time from the airport is approximately one hour. Rental autos are available at the airport, from the following companies:

| <u>Rental Car Agency</u> | <u>Telephone</u> |
|--------------------------|------------------|
| Alamo | (800) 327-9633 |
| Avis | (800) 331-1212 |
| Budget | (800) 527-0700 |
| Dollar | (800) 800-4000 |
| Enterprise | (215) 497-9048 |
| Hertz | (800) 654-3131 |
| National | (800) 227-7368 |

Train service to the Trenton area is provided by:

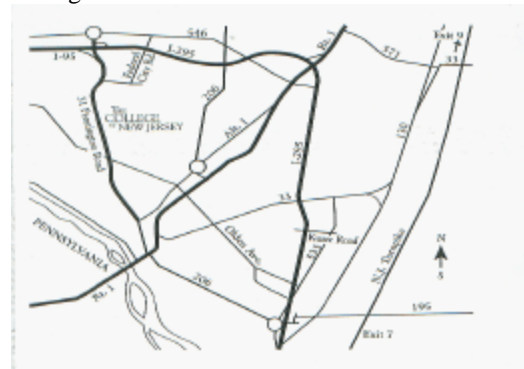
| <u>Railroad</u> | <u>Telephone</u> |
|--------------------|------------------|
| Amtrak | (800) 872-7245 |
| New Jersey Transit | (973) 762-5100 |



Road map to the official SETICon04 Hotel

To Hotel from NJ Turnpike: Exit 9 to Route 18 North 1/2 mile to Route 1 South, 18 miles. Hotel is on the right.

To Hotel from Philadelphia: 95 North into New Jersey, to Route 1 North; 4 miles. Make U-turn at Carnegie Boulevard. Hotel is on the right Southbound side.



Road map to The College of New Jersey

Driving Directions to SETICon04

From the New York State Thruway:

Take the New York State Thruway/I-87 South. Take the I-287 South/Route 17 South exit. Merge onto I-287 South. Take the U.S. 202 South/U.S. 206 South exit. Continue on U.S. 202 South. At the Flemington Circle, continue on U.S. 202/31 South. Exit U.S. 202/31 onto Route 31 South (Trenton). Follow Route 31 South until the entrance to The College (about 1.5 miles past the junction of I-95, left at the second traffic light).

From Long Island:

Take the Verrazano Bridge to Staten Island. Stay on 278 West to Goethals Bridge. After crossing the bridge, take first exit for 95 South (NJ Turnpike). Follow directions from NJ Turnpike below.

From the New Jersey Turnpike (Newark International Airport and North):

Using the New Jersey Turnpike, travel south to exit 7A, Trenton and Shore Points. Follow signs toward Trenton onto I-195 West. Follow signs marked 295/ Princeton/ Camden. Exit at 60B for "I-295 North/ Rt 1/I-95 South/Princeton". Continue on I-295 (becomes I-95 South) to exit 4. Turn left off the exit ramp onto Pennington Road/Route 31 South toward Ewing.

From I-80:

Take I-80 East to the U.S. 206/Route 183 exit. Keep right at the fork in the ramp. Merge onto U.S. 206. Take the I-287 South ramp toward Somerville (I-78)/Princeton. Merge onto I-287 South. Take the U.S. 202 South/U.S. 206 South exit. Continue on U.S. 202 South. At the Flemington Circle, continue on U.S. 202/31 South. Exit U.S. 202/31 onto Route 31 South (Trenton). Follow Route 31 South .

From New Brunswick:

Take Route 1 South to I-95 toward Pennsylvania to exit 4. Turn left off the exit ramp onto Pennington Road/Route 31 South toward Ewing.

From Asbury Park-Freehold Area:

Take I-195 West toward Trenton. Follow signs marked 295 Princeton/Camden. Exit at 60B for "I-295 North/Rt 1/I-95 South/Princeton". Continue on I-295 (becomes I-95 South) to exit 4. Turn left off the exit ramp onto Pennington Road/Route 31 South toward Ewing.

From Route 78 (Easton, PA and the West):

Take Route 78 East into New Jersey. Continue to exit 17 (Route 31 South/Flemington and Trenton). Continue South on Route 31 into the Flemington Circle. Take Route 202/31 South. Exit at Route 31 South (Trenton). Follow Route 31 South.

From Atlantic City:

Take Atlantic City Expressway West (toward PA). The expressway ends at Route 42. Follow Route 42 North to

I-295 North. Continue on I-295 (becomes I-95 South) to exit 4. Turn left off the exit ramp onto Pennington Road/Route 31 South toward Ewing.

From the PA Turnpike (Pittsburgh and Ohio):

Take the Pennsylvania Turnpike/I-276 East to the Philadelphia/U.S. 1 exit. Keep left at the fork in the ramp. Merge onto U.S. 1 North Lincoln Highway. Stay straight to go onto U.S. 1 North. Take the I-95 North exit toward Trenton. Merge onto Delaware Expressway/I-95 North. Proceed into New Jersey. Take exit 4A (Route 31/Pennington Road). Off the exit ramp, you will be traveling south on Route 31.

From I-95 South (Camden/Delaware/Phil. Int'l Airport):

Using I-95 North, continue into Pennsylvania, through Philadelphia. Continue on I-95 North into New Jersey. Take exit 4A (Route 31/Pennington Road). Off the exit ramp, you will be traveling south on Route 31.

Once on Route 31 South: At the second traffic light (about 1.5 miles), make a left into The College entrance. ❖

Don't Miss Joe Taylor, our SETICon04 Banquet Speaker!

The SETI League and the 11th International Ham Radio Moonbounce Conference are pleased to announce that they have scheduled **Prof. Joseph Taylor, K1JT** as featured speaker at their joint Banquet on 7 August 2004. Dr. Taylor, Professor of Physics and former Dean of Faculty at Princeton University, shared the 1993 Nobel Prize in Physics with his former student Russell Hulse, for gravitational research stemming from their earlier discovery at the Arecibo Observatory of the first binary pulsar.

Joe Taylor is both a world-class radio astronomer and a lifelong radio amateur, well known for his development of the WSJT and JT-44 digital communications modes being used for moonbounce, meteor scatter and tropo-scatter contacts worldwide. Using his own software and a modest station, he regularly places well in ARRL VHF/UHF and Moonbounce Contests. He routinely acknowledges the prominent role which his amateur radio background has played in his professional and academic success, and can be expected to touch on the important contributions still to be made by dedicated amateurs in the fields of radio astronomy and SETI.

The SETICon04 banquet is sure to be a sellout, and tickets will likely not be available at the door. You are encouraged to pre-register for this year's banquet by 30 June 2004.

For the fourth year in a row, SETICon is being hosted by The College of New Jersey, Trenton NJ, and co-sponsored by the IEEE Student Chapter and the American Radio Relay League. This year, for the first time, our annual Awards Banquet is being shared with the International Ham Radio Moonbounce Conference, which is being held at The College of New Jersey concurrently with SETICon. ❖

Special SETICon Section



Celebrating Ten Years of Privatized SETI

SETICon04 Pre-Registration

Pre-registration for the SETICon04 Technical Symposium has been set at \$50 US for SETI League members, and \$75 US for non-members, if received by 30 June 2004. Registration fees will increase by \$25 after that date. One copy of the conference Proceedings, admission to the conference Hospitality Suites, and refreshments are included in the registration fee.

Advance registration and payment is required for the optional Friday morning Microwave Hardware Construction Workshop. The fee includes all necessary materials, and is non-refundable. Tickets for the Saturday night Awards Banquet must be ordered in advance at \$30 US each, and additional Proceedings copies may be purchased at the door for \$20 US. All SETI League members in good standing are welcome to attend Sunday's Annual Membership Meeting, whether registered for the Symposium or not.

Please use the forms on this page to register for SETICon04, order additional Proceedings, purchase Awards Banquet tickets, and remit payment by credit card.

Note: All SETICon04 information given here is preliminary. Please see our website, http://www.setileague.org/seticon, for the latest updates.

Please accept my registration for the 2004 SETI League Technical Symposium and Annual Membership Meeting, as follows:

(pre-registrations must be received by 30 June 2004)

Members pre-registering for SETICon: _____ at \$50 US each
Non-Members pre-registering: _____ at \$75 US each
Total number of Banquet Tickets: _____ at \$30 US each
Additional Proceedings copies: _____ at \$20 US each
Hardware workshop registrations: _____ at \$150 US each

Your full name: _____

Additional persons attending: _____

Street Address: _____

City: _____

State or Province: _____

Postal Code: _____

Country: _____

Please fill in the amounts below:

Total due for Symposium Registration (at \$50 US for SETI League members, \$75 for non-members): _____ \$ US
Total due for Banquet Tickets (at \$30 US each): _____ \$ US
Total due for Additional Proceedings (at \$20 US each): _____ \$ US
Hardware Workshop Registrations (at \$150 US each): _____ \$ US
Additional Contributions: _____ \$ US
Total Payment Remitted: _____ \$ US

Deadline: Pre-registration and payment are due by 30 June 2004. After that date, attendees may register at the door for an additional fee of \$25 US per person.

Lodging: Hotel reservations must be made directly with the Conference Hotel, as indicated elsewhere in this issue. Please make your hotel reservations by 30 June 2004.

Pleased to Accept Credit Cards

The SETI League invites you to pay your SETICon04 fees and additional contributions via Visa or MasterCard. Please fill out the form below and return it with any order. We thank you for your ongoing support.

Circle One: Visa / MasterCard Exp. _____ / _____

Card Number: _____

Cardholder: _____

Billing Address: _____

Total Contribution (US Dollars): _____

Signature: _____

Today's date: _____

Clarifying Statistical Significance

By David Woolley

Looking at the Spring 2004 *SearchLites*, I have to take issue with the quantitative aspects of the article on significance.

The most obvious point is that one would expect the numbers of sigmas to be measured in linear power units, not in logarithmic (dB) ones. This still results in values relative to mean noise, but only because sigma is likely to be proportional to mean noise (in fact, if the noise is ideally Gaussian (and I believe this is quite a good approximation) sigma is actually the same as the mean power.

Next, the number of sigmas corresponding to a particular percentile depends on the probability density distribution. The idealized linear power PDF is far from the Gaussian pattern on which I suspect that the 98% figure was based. Taking logs will complicate the analysis further.

For the idealized (Gaussian noise) power distribution, +/- 3dB actually corresponds to about 57% of possible values, a lot less than the 98% in the hypothetical example. (As a linear measurement, 1 sigma corresponds to zero power at the bottom of the range, so can never be exceeded in that direction, and +/- 1 sigma is about 86.5%; about 98.2% are below 3 sigma, and about 99.9999% below 6 sigma.)

The example could also mislead, in that what matters is the variation in the noise when observing the same source under essentially the same observing conditions; it is not the variation due to pointing at the galactic core versus out of the plane, etc.

Sigma is normally used as a figure of merit for Gaussian distributions, but doesn't have a completely straightforward relationship to probability of occurrence, even then. Gaussian noise has a Gaussian distribution in volts/meter, but the corresponding power distribution is negative exponential.

The real figure that one is interested in, though, is not the number of sigmas, but the probability that a particular value will be exceeded by the noise.

The effect on this probability of obtaining two precisely agreeing measurements is to square the probability that the value won't be exceeded by the noise. This, incidentally, is the same gain as would be achieved by two consecutive measurements from the same station and doesn't actually require a large change in signal for the same probability to be obtained by simply receiving a 3dB stronger signal. The real benefit of additional measurements is that it eliminates equipment faults and local (including passing satellite) signal sources.

One final, minor detail, is that one is only ever measuring signal plus noise, and as you never know the instantaneous noise, you never know the instantaneous signal (as such, I misused signal in "3dB stronger signal"). ❖

SearchLites Author's Guide

SETI League members and supporters are invited to contribute articles to our quarterly newsletter, *SearchLites*, the world's longest-running SETI publication. We welcome science fact articles, technical submissions, guest editorials, and film, book, and software reviews relating to the scientific Search for Extra-Terrestrial Intelligence.

SearchLites articles are generally 500 to 1,000 words in length. Longer works may be submitted to [Contact In Context](#), our online peer-reviewed scholarly journal, or to the Proceedings of our annual [SETICon](#) technical symposia.

SearchLites contributions should be submitted via [email](#) to our Editor, as straight ASCII text. Submissions must contain the name, affiliation, amateur radio callsign (if any), and email address of the author, and must be original works to which the author holds all rights. If previously published works are submitted, it is the responsibility of the author to secure reprint rights from the original publisher. Submissions will be acknowledged only via email, and become the property of The SETI League, protected by the copyright of the issue of *SearchLites* in which they appear. Decisions to publish rest solely with The SETI League, Inc. Submissions may be edited for length and style.

Opinions expressed in *SearchLites* submissions are those of the individual authors, and do not necessarily reflect the position of The SETI League, Inc., its Trustees, officers, Advisory Board, members, donors, or commercial sponsors. ❖

A First:

SETI League Releases Conference Proceedings on CD-ROM

Little Ferry, NJ., 24 April, 2004 -- Following the success of its first European SETI Science and Technology Workshop, The SETI League, Inc., grassroots leader in the privatized Search for Extra-Terrestrial Intelligence, has released its first ever Conference Proceedings on CD-ROM. An interactive hypertext CD which is read with a computer and web browser software, *Proceedings of EuroSETI04* contains 325 files, totaling 500 MBytes of papers, graphics, photos, software and songs presented at last month's meeting in Herten, Germany.

"For the past three years," notes SETI League executive director H. Paul Shuch, who chaired EuroSETI04 and edited its Proceedings, "we have published and sold printed Proceedings books for our annual Technical Symposia. This practice is wasteful of trees, not to mention our nonprofit organization's limited printing and postage budget. It seems entirely appropriate for an organization that embraces electronic communications in its scientific mission to distribute its Conference Proceedings using the latest in digital technology."

Examples of the twenty papers presented at EuroSETI04 include "Test SETI During Transmission of Interstellar Radio Messages," by Dr. Alexander Zaitsev of the Institute for Radio Astronomy, Moscow; "A New Amateur X-Ray Spectrometer," by Christian Monstein of ETH Zurich; "The Radio-Quiet Cone Above the Far Side of the Moon," by Dr. Claudio Maccone of Alespazio, Torino; and "Introduction to the Electromagnetic Spectrum," by SETI League executive director Dr. H. Paul Shuch. Though The SETI League is composed primarily of dedicated amateurs, the presentations were of the highest professional quality, as reflected in the contents of the Proceedings.

The Proceedings CD was distributed to those members who travelled from eight different countries to attend the recent European technical meeting. It can now be purchased by SETI enthusiasts and interested engineers, scientists, students, and educators worldwide from the group's website, at <http://www.setileague.org/admin/applicat.htm#mdse>. The CD sells for \$15 US postpaid to US addresses, or \$20 US postpaid anywhere else in the world. One need not be a SETI League member to order the Proceedings. ❖



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