



# SearchLites

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The Quarterly Newsletter of The SETI League, Inc.

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## Are We Alone?

by Prof. H. Paul Shuch  
Executive Director Emeritus

Are we alone, the sole sentient species in the cosmos? Or, might there be others with whom we share the universe? It's a fundamental question, which has haunted humankind since first we realized that the points of light in the night sky are other suns. Now, for perhaps the first time in human history, we have the technology to begin to seek a definitive answer.

Contemporary scientific theories point to the likelihood that we inhabit a universe teeming with life. The emerging science of astrobiology, which contemplates the origin and distribution of life, is just beginning to bring in supporting evidence. Over the past dozen years, astronomers have detected hundreds of planets orbiting distant stars. A few of those planets now appear likely to support liquid water, a condition necessary for the emergence of life as we know it. We have long known that the chemical precursors of life permeate the black void of space. Recently, in the space between the stars, we have detected chemical processes abundant that seem to mimic life. Many of us now believe that the emergence of life is as much a part of the natural cycle as are the burning of stars and the spinning of planets.

But, belief itself does not make it so. Scientists must continually guard against allowing their beliefs to overshadow their objective observations. We take pains to separate faith from fact. We can argue until our sun burns out, but the only way we will ever know for sure about other life is to search for it.

Fortunately, the tools for that search fall readily to hand. Around the world, dozens of organizations are digging deep for life's signature. They are doing so under private funding, with sophisticated equipment developed on a shoestring budget. The search for life is one of the greatest scientific bargains of all time.

One of the many search strategies to detect intelligent extraterrestrial life (the one to which I have dedicated a significant fraction of my life) is SETI, a science that uses radio telescopes to seek out artificially generated radio and laser signals in space. So far, none has been convincingly confirmed. But, we're in our technological infancy; a thorough SETI search may take generations. SETI is not a science that offers much to he or she who demands instant gratification. To date, not only have we not yet scratched the surface; we haven't even felt the itch.

If we do the search, and we do it right, sometime in the distant future we will have arrived at one of two conclusions: either we are not alone in the cosmos, or we are. Either possibility boggles the imagination. ❖

*Guest Editorial*

## **Should We Shout Into the Darkness?**

by Larry Klaes (lklaes@coseti.org)

Are there other intelligent beings in the Universe? Should we try to contact them or just listen and look for their signs? This article introduces the potential pros and cons of whether humanity should call into the unknown depths of space or stay quiet.

In early February, 2008, a 230-foot wide radio antenna in Madrid, Spain transmitted the Beatles song "Across the Universe" into the Milky Way galaxy, aimed specifically at Polaris, the North Star, located 431 light years from Earth. Paul McCartney approved of this event, which was handled by NASA through its Deep Space Network of radio telescopes spread across the planet. John Lennon's widow, Yoko Ono, considered the broadcast of this song to be... the beginning of the new age in which we will communicate with billions of planets across the Universe."

One month later, astronomers in the United Kingdom announced they would be sending their own broadcast to the star 47 Ursae Majoris, namely an advertisement for the snack manufacturer Doritos, with more ads to follow that one to the stars.

While both of these transmissions are mainly publicity stunts - the Beatles song commemorated several simultaneous anniversaries and the Doritos ad will help the UK raise funds to save its threatened astronomy and physics programs - these actions do illuminate an important question that has been part of an increasing debate: How wise is it to announce humanity's presence to the rest of the Universe?

Since 1960, when the former Cornell astronomer Frank Drake conducted the first modern Search for Extraterrestrial Intelligence (SETI) project which he named Ozma, scientists have been listening and looking for any signs of alien civilizations in our galaxy and beyond. The hope has been that - since we do not yet have interstellar vessels - someone out there is sending a deliberate radio or optical message to us, or using an omnidirectional beacon, or leaking electromagnetic signals into space just like we have been for the last century with our radio, television, and radar broadcasts.

In the nearly five decades since Drake's Project Ozma, no definite signals of an intelligent alien origin have been found. This does not mean that ETI do not exist, but some have wondered if, in a galaxy with 400 billion stars systems stretched across 100,000 light years of space, it might help the situation to transmit messages into the Milky Way galaxy to facilitate getting the attention of any possible cosmic neighbors to encourage them to let us know they exist.

Scientists such as Drake and the late Cornell astronomer Carl Sagan view finding an intelligent alien civilization as a major boon to humanity in terms of vastly increasing our scientific and technological database. Other experts are rather uneasy about the prospect. They cite historical examples of what happens when an advanced culture encounters a more primitive society as reason to be very cautious about sending electromagnetic greetings into deep space. Some advocate sending no messages at all until we are more developed and better understand who and what inhabit the galaxy.

For good or ill, a few deliberate attempts have been made to signal extraterrestrial intelligences, starting with the Arecibo Message sent from the giant radio telescope to a distant globular star cluster named Messier 13 in 1974. The 1970s also witnessed the first launching of several robot probes that have left the Solar System with engraved messages for any beings who may one day find them drifting through space.

Within the last decade, Professor Alexander L. Zaitsev of the Institute of Radio Engineering and Electronics at the Russian Academy of Science has emerged as a strong advocate of messaging to extraterrestrial intelligences, also known as METI. Zaitsev also orchestrated several METI projects, such as the Cosmic Calls of 1999 and 2003 and the Teen Age Message of 2001, all sent from the 230-foot wide radio telescope at the Evpatoria Deep Space Center in the Ukraine. Moving at light speed (186,000 miles or 300,000 km per second), these messages will arrive at their targeted star systems in the latter half of this century.

In a paper Zaitsev published in 2006, the scientist notes that "SETI is meaningless if no one feels the need to transmit." Zaitsev also feels that if there are advanced cultures bent on harming humanity, they will find us eventually, so it is in our best interests to seek them out first. Zaitsev sees the great distances between stars and the physical limits imposed by attempting to attain light speed serve as a natural protective barrier for our species and any other potentially vulnerable beings in the galaxy.

Scientist and science fiction author David Brin feels that in spite of the celestial limitations noted by Zaitsev, any transmissions sent spaceward without first being discussed by a broad range of disciplines is both improperly representative of humanity and poses the danger of attracting beings that may bear us ill will.

"As newcomers in a strangely quiet Cosmos, shall we shout for attention?" asks Brin. "Or is it wiser to continue quiet listening? We propose an interdisciplinary symposium, to be the most eclectic and inclusive forum, by far, to deliberate the METI issue. It is not too much to ask that METI people hold back until the world's open, scientific community can get a chance to examine their proposal."

Paul Gilster of the Tau Zero Foundation (founded by Marc Millis, former head of NASA's Breakthrough Propulsion Physics program) that conducts research into interstellar travel, also recommends restraint. "Two aspects of METI trouble me deeply," he says. "The first is that serious messaging has taken place without any consensus or indeed consultation here on Earth. The various signals sent from Evpatoria in the Crimea were simply announced, yet such messages have implications for our entire species and at the very least should be considered in an international, multi-disciplinary forum before being sent.

"The second troubling aspect of all this is that recent messages from NASA and European sources have been treated in the press more or less as larks, the assumption being either that extraterrestrials are benign or that they do not exist in the first place. I favor a moderate, cautious approach to deliberately announcing our presence to the Universe."

Seth Shostak, the Senior Astronomer at the SETI Institute, is not terribly concerned about any kind of alien invasion. Like

Zaitsev, Shostak agrees that a technologically sophisticated civilization could find Earth and humanity if they chose to; as one example, our military and planetary radars are among the brightest electromagnetic sources produced by our species.

As the Chair of the International Academy of Astronautics SETI Permanent Study Group, Shostak and his team have been looking into how we should respond to a message from an ETI received on Earth. Brin and others claim that the study group's members are too narrowly focused in their representation of the sciences. Shostak maintains that in addition to their focus being on replying to a received alien transmission, the group has neither the right nor the ability to police the rest of humanity on what they broadcast - an issue that will only grow more complex as our technology becomes more sophisticated.

Personally, I am in the middle. I see the legitimate points of both sides, though I think some of our attempts at contact might be perceived as childish (or at least very basic) by any advanced ETI. Also, I wonder how many galactic cultures are similar to ours at this point in time, if any exist at all. Unless our galaxy is composed of societies and beings a lot like the ones in Star Trek, my feeling is that many of them will be either really behind us (and not even intelligent/aware at all) or so beyond us as to make communication nearly pointless.

Humanity is already sending messages into the galaxy and that is only going to increase, not diminish. So we had better deal with this, rather than hope people restrain themselves when they have the chance to broadcast a message into deep space.

Even if ETI don't understand what we are sending them, they will likely be aware that there is some kind of intelligence on Sol 3 and may want to respond to us. We should ready ourselves for the realization that we are not on some isolated island in the middle of nowhere, but part of a much larger galactic community - even if the community is "just" a lot of star systems with no high level inhabitants - and we should start acting accordingly.

And even if no ETI ever picks up our leakage or broadcasts, our descendants will be heading out into the galaxy one day, so one way or another we will make our presence known - and that is what we need to prepare for: how alien societies, if they exist, will react to us. I think that any society, no matter how advanced now, had to develop much as we did, just as all life on this planet had to evolve and all our ancestors struggled to make it to the present. So maybe they will "get" us and at least know what we are going through, because they were once children, too.

Which begs the question, are there others out there at our level, making lots of noise into the galaxy, wondering where everybody else is? Have we just not gotten their messages yet, or have they been silenced by somebody who preys on such naive behavior? Or are we the only ones like ourselves in the galaxy? I think we need to be brave and forge ourselves into the galaxy. If we stay at home and hide under the beds, we might live a bit longer, but we won't evolve any.

**Disclaimer:** The opinions expressed in editorials 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. ❖

## The Bet Has Been Won!

by Prof. H. Paul Shuch, Executive Director Emeritus

The wager was intriguing. It was proposed on the Long Bets website by Tibor Pacher, who runs the Peregrinus Interstellar website, and the challenge was accepted by Paul Gilster of Centauri Dreams. Since both parties to the wager are friends of The SETI League, I felt compelled to follow the debate closely.

The bet in question, as posted by Pacher, reads:

"The first true interstellar mission, targeted at the closest star to the Sun or even farther, will be launched before or on December 6, 2025 and will be widely supported by the public."

The conditions to be satisfied in winning this bet are quite specific:

1. The mission can be a manned or unmanned flyby probe or to be captured by the target star's gravitational field. It will have been designed expressly as a mission to another star, and not an outer-Solar System mission that keeps going.
2. Allowed launch location of the spacecraft is any place in the Solar system within the orbit of Neptune, either from the surface of a solar system body or from any orbital position.
3. As a minimum requirement for the mission the spacecraft shall be capable to deliver data for at least one scientific measurement.
4. Planned mission duration shall be less than 2,000 years.

Gilster is arguing against Pacher's prediction, but it seems to me that the bet has already been won. I would argue that the first interstellar missions have already launched, and that (exercising only a little imagination) they meet the above conditions. Those missions involve not spacecraft, but rather streams of photons, the fastest spaceships known to man.

Think about it: interstellar microwave transmissions probe other civilizations' interest in dialog, and pass numerous stars, thus are "flyby probes" in a sense. They are transmitted specifically for the purpose of reaching other solar systems. They have been "launched" (transmitted) several times from Earth, which is clearly within the orbit of Neptune. Some have conveyed scientific information about Earth, which satisfies the condition that they "deliver data for at least one scientific measurement." They travel at the speed of light, so within the 2,000 year mission duration, will reach stars within 2,000 LY of our own Sun. And they are widely supported by the public, as witness the large number of humans who have submitted messages to the various projects that beam them into space. So, congratulations Tibor, you win!

Nevertheless, Tibor and Paul agree that what they had in mind is slightly larger interstellar probes. So, I guess we'll have to wait a little longer to see whose position prevails.

Long Bets is an initiative of the future-oriented Long Now Foundation, and I've been a party to wagers posted there. Its purpose is to improve longterm thinking. Long Bets is a public arena for enjoyably competitive predictions, of interest to society, with philanthropic money at stake. The Long Now Foundation furnishes the continuity to see even the longest bets through to public resolution. Their website provides a forum for discussion about what may be learned from the bets and their eventual outcomes. ❖

## Detection Probability of Terrestrial Radio Signals by a Hostile Super-Civilization

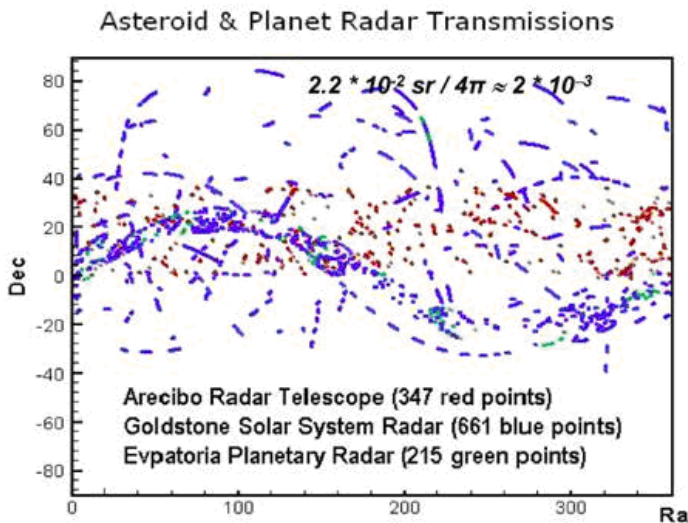
by Dr. Alexander L. Zaitsev, alzaitsev@gmail.com

Comparison of the total number of the radar astronomy transmissions with respect to that used for sending messages to extra-terrestrial civilizations reveals that the probability of detection of the radio signals to extraterrestrials (ETs) is one million times smaller than that of the radar signals used to study planets and asteroids in the Solar System.

There are three large-dish instruments in the world that are currently employed for doing radar investigations of planets, asteroids and comets [1]: ART (Arecibo Radar Telescope), GSSR (Goldstone Solar System Radar), and EPR (Evpatoria Planetary Radar). Radiating power and directional diagram of these instruments is so outstanding that it also allows us to emit radio messages to outer space, which are practically detectable everywhere in the Milky Way. This dedicated program is called METI (Messaging to Extra-Terrestrial Intelligence) [2], as contrasted to SETI (Search for Extra-Terrestrial Intelligence), [3].

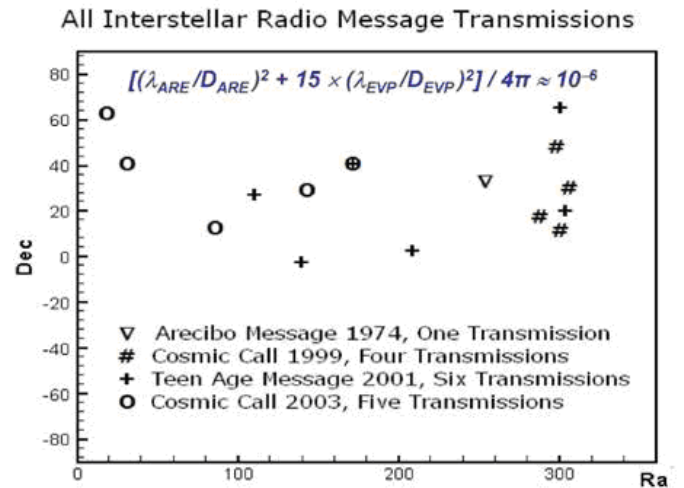
Recently, some scientists and SF writers have expressed their concern [4] that sending messages to the stars in our galaxy, which may have a habitable life, jeopardizes existence of our own civilization because our signals helps ETs to pin down location of the Solar System in the Milky Way. If the Aliens reached the level of a super-civilization, it might send a space fleet to the Earth to either destroy it or to convert us to slaves.

The goal of this letter is to estimate the probability of detection of the terrestrial radio signals by a presumable hostile super-civilization existing somewhere in our galaxy. Our calculation starts from the notice that over all the radar astronomy history about 1,400 sets of radio transmissions were produced. Their distribution all over the sky is shown in Figure 1 in the plane of ecliptic coordinates.



The total area of the sky illuminated by these transmissions, is about 0.022 steradians (sr), or about  $2 \cdot 10^{-3}$  part of

the whole sky. The total number of METI transmissions is 16 sets only [5], and the total area of sky, illuminated by the METI transmissions, is about 10-5 sr, or 2000 times less than that covered by radar astronomy transmissions, Figure 2.



Total duration of time of radar transmissions exceeds the overall time interval of the METI transmissions by a factor of 500. Therefore, we can conclude that the probability to detect the radar astronomy transmissions by a hostile super-civilization is  $2000 \times 500 = 1,000,000$  times higher than that of the METI transmissions.

So, if someone is concerned about our detection by an aggressive super-civilization (so-called METI-phobia, [6]), first of all one has to prohibit not the METI, but the radar astronomy. However, one can not prohibit it because the radar astronomy is an important and indispensable component of the asteroid hazard and defense system [7]. For this reason, we conclude that all on-going conversations about the ETs danger of METI for our civilization are meaningless, and the radar astronomy instruments should remain open for doing further exploration of the interstellar space with METI transmissions.

### References

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*Editor's Note: This paper first appeared in Journal of Radio Electronics No. 5, 2008, Russian Academy of Science, and is used here by the kind permission of the author. ❖*

## Executive Director Emeritus Lauded for Luxuriant Hair

**Little Ferry, NJ., October 2008** -- Regular visitors to The SETI League website may have noticed in its Featured Photos section that, in the two years since his retirement, Executive Director Emeritus H. Paul Shuch's hair has grown out of control. That fact has now been properly acknowledged, with Shuch's recent induction into the prestigious Luxuriant Flowing Hair Club for Scientists (LFHCfS). An initiative of AIR, the Annals of Improbable Research ([improbable.com](http://improbable.com)), a spoof periodical that pokes fun at science in general and scientists in particular, LFHCfS seeks to honor those scientific leaders who let their hair down -- all of it -- to boldly flow where no hair has flowed before.

Shuch was recommended for LFHCfS membership by colleague Kathryn Denning, an anthropologist at York University in Canada who has long studied the peculiarities of scientists, including their penchant for growing hair. Drs. Shuch and Denning serve together on the SETI Permanent Study Group of the International Academy of Astronautics ([iaaseti.org](http://iaaseti.org)).

When informed of this high honor by AIR editor and chief AIRhead Marc Abrahams of Harvard University, Shuch responded, "Oh, goody. I can't wait to update my curriculum vitae." He vows not to cut his hair until it falls out of its own accord (an occurrence likely to happen sooner rather than later, he notes, given the well established half-life of hair), and hopes this long overdue recognition will propel him toward accomplishing his lifelong goal of being awarded an IgNobel Prize. The annual IgNobels, another AIR initiative, seek to recognize fringe science.

"I deserve this," insists Shuch. "There's no science more fringe than SETI." Then, demonstrating his well-known ability to transmogrify metaphors, he adds, "life is too serious to be taken shortly."

SETI scientists seek to determine through microwave and optical measurements whether humankind is alone in the universe. Since Congress terminated NASA's SETI funding in 1993, The SETI League and other scientific groups have been attempting to privatize the research. Experimenters interested in participating in the search for intelligent alien life, or citizens wishing to help support it, should email to [join\\_at\\_setileague\\_dot\\_org](mailto:join_at_setileague_dot_org), check the SETI League Web site at <http://www.setileague.org/>, send a fax to +1 (201) 641-1771, or contact The SETI League, Inc. membership hotline at +1 (800) TAU-SETI. Be sure to provide us with a postal address to which we will mail further information. The SETI League, Inc. is a membership-supported, non-profit [501(c)(3)], educational and scientific corporation dedicated to the electromagnetic Search for Extra-Terrestrial Intelligence.



## Event Horizon

SearchLites' readers are apprised of the following conferences and meetings at which SETI-related information will be presented. League members are invited to check our World Wide Web site ([www.setileague.org](http://www.setileague.org)) under *Event Horizon*, or email to us at [info@setileague.org](mailto:info@setileague.org), to obtain further details. Members are also encouraged to send in information about upcoming events of which we may be unaware.

**February 13 - 15, 2009:** Dr. SETI to be Featured Filker at *Boskone 46*, Boston, MA.

**March 20 - 22, 2009:** *Lunacon 2009*, Rye Brook, NY.

**April 3 - 5, 2009:** Dr. SETI to be Filk Guest of Honor at *I-Con 28*, Brentwood campus of Suffolk Community College, NY.

**April 18, 2009, 0000 UTC - 2359 UTC:** Tenth annual *SETI League Ham Radio QSO Party*: 3.551, 7.0309, 7.2039, 14.084, 14.204, 21.306, and 28.408 MHz.

**April 19, 2009:** Fifteenth *SETI League Annual Membership Meeting*, Little Ferry NJ.

**April 24 - 25, 2009:** 13th Annual *Southeastern VHF Conference*, Charlotte, NC.

**April 25 - 26, 2009:** 34th *Trenton Computer Festival*, Ewing NJ.

**May 15 - 17, 2009:** *Hamvention 2009*, Dayton OH.

**May 22 - 25, 2009:** *Balticon 43*, Hunt Valley, MD.

**May 29 - 31, 2009:** *Rochester Hamfest*, Rochester NY.

**June 19 - 21, 2009:** *Concertino '09*, Arlington, MA.

**June 28 - July 1, 2009:** *Society of Amateur Radio Astronomers Conference*, NRAO Green Bank WV.

**July 23 - 25, 2009:** *Central States VHF Conference*, St. Charles IL.

**August 6 - 10, 2009:** *Anticipation*, 67th World Science Fiction Convention, Montreal, Quebec Canada.

**September 4 - 6, 2009:** *Fifth International Radio Astronomy Congress*, Heidelberg, Germany.

**October, 2009 (dates TBA):** *Microwave Update 2009*, Dallas, TX.

**October 12 - 16, 2009:** *60th International Astronautical Congress*, Daejeon, Korea.

**April 17, 2010, 0000 UTC - 2359 UTC:** Eleventh annual *SETI League Ham Radio QSO Party*: 3.551, 7.0309, 7.2039, 14.084, 14.204, 21.306, and 28.408 MHz.

**June 4 - 6, 2010:** *Rochester Hamfest*, Rochester NY.

**June 2010 (dates TBA):** *Society of Amateur Radio Astronomers Conference*, NRAO Green Bank WV.

**October 2 - 6, 2010 (proposed):** *66th World Science Fiction Convention*, Melbourne Australia.

**October 2010 (dates TBA):** *61st International Astronautical Congress*, Prague, Czech Republic.

**October 2011 (proposed; dates and details TBA):** *62nd International Astronautical Congress*, South Africa.



**Book Reviews:**

**Unmasking Europa: The Search for  
Life on Jupiter's Ocean Moon**

Richard Greenberg, University of Arizona,  
Lunar and Planetary Laboratory, Tucson

***A Close Look at Europa . . .  
And How Big Science Gets Done . . .***

The second-largest of Jupiter's four major moons, Europa is covered with ice, as confirmed in views from modern telescopes and the thousands of images returned by NASA's Voyager and Galileo missions. But these higher-resolution views also showed that the ice is anything but smooth.

In fact, Europa's surface is covered with vast criss-crossing systems of mountain-sized ridges, jumbled regions of seemingly chaotic terrain, and patches that suggest upwellings of new surface materials from below.

How scientists think about the underlying forces that shaped this incredibly complex, bizarre, and beautiful surface is the subject of this book.

In *Unmasking Europa*, Richard Greenberg tells the story of how he and his team of researchers came to believe that the surface of Europa is in fact a crust so thin that it can barely hide an ocean of liquid water below.

He shows how the ocean is warmed by the friction of tidal movements in this small moon as it orbits around immense

Jupiter. The implications of this interpretation—which includes the idea that there are active intermittent openings from the liquid ocean to the frozen surface—are immense. The warmth, the chemistry, and the connections from ocean to surface provide the conditions necessary for the existence of life, even at this relatively remote locale in our solar system, far beyond what's normally thought of as its 'habitable zone.'

*Unmasking Europa* describes in clear but technically sophisticated terms – and with extensive illustrations (including more than 100 NASA images) – the remarkable history of research on Europa over the last four decades. The book also provides unique insights into how “big science” gets done today, and it is not always a pretty picture. From his perspective as professor of Planetary Science at the University of Arizona, and a quarter-century-long membership on the Imaging

Team for NASA's Galileo mission, Greenberg describes how personal agendas (including his own) and political maneuvering (in which he received an education by fire) determined a lot about the funding, staffing, and even the direction of the research about Europa.

At the same time, the book captures the excitement and satisfaction of discovery as Greenberg's team came to understand how the character of Europa makes it, perhaps, the most likely place for us to finally encounter extra-terrestrial life.

*Contents: Water world.- Touring the surface.- Doing science. Planetary stretch.- A closer look at tidal effects.- Global crack patterns.- Building ridges.- Mind the gap.- Strike-slip.- Convergence.- Return to Astypalaea.- Cycloids.- Chaos.-Thick vs. thin.- The scars of impact.- The bandwagon.- The biosphere.- Explorations to come.*

**Lonely Minds in the Universe**

by Giancarlo Genta (Copernicus Books, 2007)

reviewed by Ivan Almar

GALILEO discovered in 1610 with his new telescope the four big satellites orbiting Jupiter. Johannes Kepler, informed of the great event, wrote a long and enthusiastic letter to Galileo, the so-called *Dissertatio cum Nuncio Sidereo*. In this opus he is referring to the discovery of the satellites as proof that planet Jupiter is inhabited:

*Therefore, if four planets orbit Jupiter at different distances and times: one asks to the benefit of whom, if nobody is on planet Jupiter to admire this variety with his eyes? then, for what we are concerned with on this Earth, I wonder; for what convincing reason? Above all, how can they be useful to us who never see them; and we do not expect that everybody can use their eye-pieces to observe them.*

and his conclusion:

*The new four [planets] are not primarily for us who live on the Earth but without doubt for the creatures who live on Jupiter.*

This is probably one of the first mentions of extraterrestrials in the present sense of the word. Planets were not considered habitable worlds during previous centuries, but only points of light in the sky, and alien beings were imagined mostly as folkloristic monsters.

But Kepler's arguments were accepted unaltered until the twentieth century, when astronomy and space research gradually discovered that the planetary bodies of the Solar System - except Earth itself - are not the property of intelligent beings. Even independent microbial life has not yet been discovered on the Moon, or on the planets. Astronomy during the last century enormously widened the limits of the observed Universe, surrounding an absolutely insignificant, tiny Earth. Billions of stars, nebulae, galaxies, and clusters of galaxies populate the empty space into billions of light-years outward. But there is as yet no proof that life as we know it exists anywhere else in this enormous, diversified Universe.

On the other hand, life on Earth exists everywhere from the depths of the crust up to the stratosphere. Recent discoveries have demonstrated that the hidden, microbial part of life might represent the predominant majority of the biomass. Our Earth, our Solar System, and our Galaxy are simple components of the Universe, and there is no evidence that they are exceptional objects in any respect.

This is certainly a very serious assertion, probably one of the most important scientific problems of the twenty-first century. *Lonely Minds in the Universe* is a fascinating analysis of this controversial situation with all its important social, philosophical, and even theological implications. In spite of the technical background of its author, the book is an enjoyable read for every thoughtful person who is interested in the past, present, and future destiny of humanity. It raises important questions, but many answers are simply not yet available. The author is convinced that the scientific search for extraterrestrial life and intelligence in the Universe deserves every effort because the result will deeply influence our future. I recommend you read this book with an open mind, which will enrich you with new ideas. ❖



## SARA Call for Papers

The Society of Amateur Radio Astronomers (SARA), a SETI League Affiliated Society that represents several hundred amateur radio astronomers around the world, hereby solicits papers for presentation at its 2009 Annual Meeting and Technical Conference, to be held 28 June through July 1, 2009, at the National Radio Astronomy Observatory (NRAO), Green Bank WV. Papers on radio astronomy hardware, software, education, research strategies, and philosophy are welcome.

H. Paul Shuch, The SETI League's volunteer executive director, also serves as SARA vice president. In that capacity, he is coordinating this joint technical meeting. SARA members, SETI League members, or supporters wishing to present a paper should email a letter of intent, including a proposed title and informal abstract or outline (not to exceed 100 words) to the SARA vice president at [vicepres@radio-astronomy.org](mailto:vicepres@radio-astronomy.org), no later than 1 March 2009. Be sure to include your full name, affiliation, postal address, and email address, and indicate your willingness to attend the conference to present your paper. Submitters will receive an email response, typically within one week, along with a request to proceed to the next stage, if the proposal is consistent with the planned program.

A formal Proceedings will be published in conjunction with this Meeting. For the fourth year in a row, the SARA Proceedings are being edited by SETI League, Inc., and published by the American Radio Relay League. Papers will be peer-reviewed by a panel of SARA members with appropriate professional expertise and academic credentials. First-draft manuscripts must be received no later than 1 April 2009, with feedback, acceptance, or rejection emails to be sent within two weeks thereafter. Upon final editing of accepted papers, camera-ready copy will be due not later than 1 May 2009. Due to printer's deadlines, manuscripts received after that deadline will not make it into the Proceedings. Instructions for preparation and submission of final manuscripts appear in a Guidelines for Submitting Papers document on the SARA website.

The last three year's Proceedings were a landmark accomplishment for both organizations. Please help the Society of Amateur Radio Astronomers to make the 2009 edition even better! SETI League members in particular are encouraged to participate in this meeting by presenting their work for the benefit of the two sister societies. Further information about SARA can be found on their website, <http://radio-astronomy.org>.



*Ask Dr. SETI* ®

## Can A Narrow Signal Carry Intelligence?

**Dear Dr. SETI:**

*If SETI receivers have to be narrow band, how is intelligence carried in these signals? Also, why do they need to be narrow band?*

*Ron, Buffalo State*

## The Doctor Responds:

To understand how ET thinks, proud Buffalo, we have to walk a parsec in his moccasins. Let's assume you're an intelligent extraterrestrial, wishing to make your presence known to the inhabitants of a distant and primitive planet (let's say, Earth). You know that the electromagnetic spectrum is a noisy place, and that your intended communications partner is going to have to separate your signal from the background noise. You also know that natural astrophysical radio emitters are inherently broadband. What to do? You could readily produce a signal that's spectrally narrow (your technology is good at that). This would clearly stand out as being artificial. It would also make it easier for the distant Earthlings to intercept, since the narrower they make their receiver, the more of the cosmic background noise they exclude, and hence the higher their received signal to noise ratio. Well, the narrowest possible signal is a pure CW (continuous wave) carrier, so that's what you send.

That's all very well and good, but communications theory suggests that a pure CW carrier contains no intelligence. But wait -- is that really true? It can be argued that the reception of such a narrow signal is in fact a one-bit message, conveying the information "here I am." Run that message through your Universal Translator, and out comes the more meaningful proclamation "you are not alone." So, information has been exchanged, in vanishingly narrow bandwidth.

OK, so maybe ETI want to communicate higher level concepts than our single-bit existence statement. Doing so will of necessity require them to transmit over a wider spectral bandwidth. But, if they want to ensure detection, they will make the job as easy as possible for the receiver, by employing a modulation mode that contains individual narrow-band components, strewn across a broader stretch of the electromagnetic spectrum. Most modulation modes used on Earth (even direct sequence spread spectrum, or DSSS) include just such narrow-band components. Initially, one such spectral component may be detected, and existence proof established. After that, follow-on analysis may well discern other spectral components, from which a coherent reconstruction of Encyclopaedia Galactica can be attempted.

But first, you have to get the attention of those primitive Earthlings -- and narrowband signals are a promising and effective way of doing so.



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