



SearchLites

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The Quarterly Newsletter of The SETI League, Inc.

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Remembering Prof. Charles H. Townes by H. Paul Shuch, Executive Director Emeritus, The SETI League, Inc.

When I was a grad student at the University of California, Berkeley, I would walk past Professor Townes' office nearly every day. I knew he was a Nobel laureate, a distinguished microwave designer, the inventor of the MASER and co-inventor of the LASER, and I was intimidated. I sometimes thought of knocking on his door and introducing myself, but I could never muster the courage.

Fast forward to July, 1996. I was attending a Bioastronomy Conference in Capri, and Prof. Townes was one of the keynote speakers. During a break between technical sessions, I wandered out into a plaza, where I encountered Townes and his wife Frances sampling wine and cheese. This being a social setting, I put down my own wine glass, summoned up all the courage its contents had afforded me, and walked up to the professor, my hand extended. "I wanted to meet you when I was a grad student at Berkeley," I stated boldly, "but I was too timid. I'm not timid anymore. Hi, I'm Paul."

Charlie Townes smiled, shook my hand, and simply said, "you should have introduced yourself sooner." Such was the measure of the man many idolized.

I consider Charlie Townes the Father of Optical SETI. In 1961, less than a year after the first crude laser was realized, Charles H. Townes authored the first scientific paper proposing interstellar communication via lasers. This was three years before receiving his Nobel prize, but Townes was already well known for his scientific contributions, as well as his interest in SETI. Maser amplifiers had become the gold standard for radio telescope front ends, and remained so even after the solid state revolution spawned Silicon Valley. Arriving at Berkeley in 1967, Townes helped Prof. Jack Welch (later one of my own thesis advisors) to procure a maser preamplifier and millimeter-wave spectrometer for the radio observatory at Hat Creek, now home to the SETI Institute's Allen Telescope Array. Using the Hat Creek facility, the two went on in 1968 to first detect interstellar ammonia, and other complex organic molecules, near the center of the Milky Way. These detections gave credence to Panspermia, the idea that molecules from space could have seeded Earth with the building blocks of life. Welch and Townes later discovered the first known naturally-occurring maser in space.

Townes remained intellectually active and professionally engaged as he approached the century mark, continuing to come to campus daily up until just last year. He retained the same office in the Physics Department that I had passed in my student days. He recently developed a laser spectrometer for the three-telescope Infrared Spatial Interferometer Array atop Mount Wilson, which is being used to search for infrared laser emissions from exoplanets newly discovered by the Kepler spacecraft.

Charlie Townes died at the age of 99 on Tuesday morning, 27 January 2015, while en route to the hospital. He will be remembered as much for his spirituality as for his keen scientific insights. When he received the Templeton Prize for contributions to spirituality in 2005, he wrote:

"My own view is that, while science and religion may seem different, they have many similarities, and should interact and enlighten each other. Science tries to understand what our universe is like and how it works, including us humans. Religion is aimed at understanding the purpose and meaning of our universe, including our own lives. If the universe has a purpose or meaning, this must be reflected in its structure and functioning, and hence in science."





Nobel laureate Prof. Charles H. Townes, the father of Optical SETI, at the OSETI III Conference in San Jose CA, 22 January 2001. SETI League photo by H. Paul Shuch.

Ask Dr. SETI ®

Whatever Happened to the Screensaver?

Dear Dr. SETI:

I am a returning SETI@home volunteer and I am wondering what happened to the dynamic screen saver classic, the one with the moving graphics. Please let me know how to get it.

Gildy (via email)

The Doctor Responds:

First off, Gildy, thank you for your efforts. SETI@home is indebted to volunteers like you.

When the SETI@home concept was expanded into BOINC (the Berkeley Open Infrastructure for Networked Computing), it opened up the concept for use on many other scientific projects, such as distributed processing for protein folding, prime number searches, and genetic mapping. Thus, the graphic which was unique for SETI signal analysis was no longer appropriate to these broader applications, so the programmers at University of California eliminated it. I too regret the loss of the pretty screens, but believe me, it is for the greater good of science.

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) under *Event Horizon*, or email to us at info@setileague.org, to obtain further details. Members are also encouraged to send in information about upcoming events of which we may be unaware.

March 21 - 22, 2015: *Society of Amateur Radio Astronomers Western Conference*, Stanford University, Palo Alto CA.

March 26 - 27, 2015: 6th IAA Symposium on *Search for Life Signatures*, Paris, France

April 18, 2015, 0000 UTC - 2359 UTC: Sixteenth 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, 2015, 1300 EDT: Twenty First SETI League *Annual Membership Meeting*, Little Ferry NJ.

April 24 - 25, 2015: *Southeastern VHF Conference*, Morehead, KY.

May 22 - 25, 2015: *Balticon 49*, Hunt Valley, MD.

June 21 - 24, 2015 (tentative): *Society of Amateur Radio Astronomers Conference*, National Radio Astronomy Observatory, Green Bank WV.

August 19 - 23, 2015: *Sasquan*, the 73rd World Science Fiction Convention, Spokane, WA.

October 2015 (dates to be announced) : *66th International Astronautical Congress*, Jerusalem, Israel.

April 16, 2016, 0000 UTC - 2359 UTC: Sixteenth annual SETI League *Ham Radio QSO Party*: 3.551, 7.0309, 7.2039, 14.084, 14.204, 21.306, and 28.408 MHz.

April 17, 2016, 1300 EDT: Twenty Second SETI League *Annual Membership Meeting*, Little Ferry NJ.

August 17 - 21, 2016: *MidAmeriCon II*, the 74th World Science Fiction Convention. Kansas City, MO.

October 2016 (dates to be announced) : *67th International Astronautical Congress*, Guadalajara, Mexico.

April 15, 2017, 0000 UTC - 2359 UTC: Seventeenth annual SETI League *Ham Radio QSO Party*: 3.551, 7.0309, 7.2039, 14.084, 14.204, 21.306, and 28.408 MHz.

April 16, 2017, 1300 EDT: Twenty Third SETI League *Annual Membership Meeting*, Little Ferry, NJ.

October 2017 (dates to be announced) : *68th International Astronautical Congress*, Adelaide, Australia. ❖



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Guest Editorial:

**Alan Turing and the Five
Sigma Theory of Progress**

by Seth Shostak, Senior Astronomer, SETI Institute
from Huffington Post, used by permission

Maybe it's something in the stout, but what's up with this burst of biopics about British boffins?

Trundle down to the local cineplex and you can enjoy a brief history of iconic physicist Stephen Hawking in *The Theory of Everything*. If your stamina is adequate, you can also savor the tormented life of mathematician Alan Turing in *The Imitation Game*, a compelling film about the efforts to break German codes during the Second World War.

Both men can be rightfully described as geniuses, and therefore by definition are highly exceptional. Stories about exceptional people have always titillated the public, as recognized by writers from Shakespeare to People Magazine.

But Turing and Hawking are scientists, and as stars in movies they're as uncommon as Swiss admirals. That's particularly true in America where, with our rough-and-tumble frontier past, we generally prefer the broad-shouldered to the brainy.

So as a researcher myself, I'm naturally pleased to see practitioners of science nailing lead roles in these well-made, popular films. It's a definite improvement over the time, almost yesterday, when scientists were bumbling accessories to the plot, and invariably unattractive, socially primitive, and obliged to wear white lab coats to every occasion.

Both of these brilliant Britons suffer massive personal challenges -- and that makes for interesting characters. But the larger story is what these prodigies bring to the table at which the rest of us sit.

In the newer of these film, *The Imitation Game*, Turing's task is no less than changing the course of war. He joins a small group of academics recruited for the Government Code and Cypher School (a clumsy name requiring two lines on the rugby jerseys). They've been brought together to break the codes used by the Nazi military, encrypted by a machine known as Enigma.

Enigma, originally developed during World War I, is said to be as impregnable as the Titanic, and indeed its combination of wheels and cable jacks allow it to generate between one and a thousand billion billion different codes, depending on the model you buy. That latter figure is comparable to the number of grains of dry sand on all the beaches of Earth.

Traditional cryptographic analysis isn't going to work anytime soon, and Turing opts to unravel the Enigma codes by building a machine based on a Polish invention known as a "bombe," an electromechanical computer. In the film, other members of his group are unconvinced by Turing's calculated approach, but the facts are, he can do without those guys.

However, they can't do without him, and that's because Turing is smarter. He's a five sigma event. And indeed, this film bends its knee at what I call the five sigma theory of human progress.

Now before you wince at the Greek, think back to that statistics course you took in college (or not). In statistics, a five sigma event is something incredibly unusual. A canonical example can be found in the statistics of human IQ. By definition, average IQ is 100. The standard deviation -- a measure of the spread of this value -- is about 15 IQ points. Roughly 68 percent of the population will fall between plus and minus one sigma from the average.

In other words, two-thirds of the folks in a random sample of Homo sapiens will have IQs between 85 and 115, and 95 percent will have IQs within two sigma of the mean. If you have a three-sigma intellect (IQ of 145, on the positive side of the mean) you can rightly put "exceptionally clever" on your business card. You're one in many hundred, and probably the envy of the lout in the next cube.

But at five sigma, you humble 99.99997 percent of the population. When it came to mathematics -- particularly the mathematics of computation -- Alan Turing was a five sigma event.

You could argue that, when all is said and done, it is the five sigma people who make the big advances. Consider an example from another discipline, music. There have been thousands and thousands of composers since musical notation gave durability to the work of these creative tune-smiths. But a millennium from now, most of their stuff will be unplayed and unremembered. Not so for five sigma composers like Beethoven, Mozart or the Beatles. The truly exceptional matter. And the situation is similar for other artists and the practitioners of any field from philosophy to physics.

This may explain our deep attraction to the brilliant outliers who, in the words of the Turing film, can do things no one can imagine. But the brutal flip side of this reductionist idea is the implication that if you're not at the five sigma level, your efforts, while admirable and even useful, will never be fodder for future memory or future textbooks -- that most of us are no more than worker bees. Essential and functional, yes. But transformative, no. We are merely plug-and-play parts in the machine.

That's simultaneously discouraging and myopic. In truth, there are millions and millions of things that humans do, and that means that most of us are five sigma practitioners at something, even if it's only caring for our garden or our cats.

The real human story isn't the lone runner, it's the race. Fifty thousand people participated in the New York Marathon this year. No doubt only a handful thought they had a chance of coming in first. But they still showed up. We don't all have to be five sigma events in the arts or sciences. The name of the game isn't "winner" -- it's "game."



Guest Editorial:

Je Suis Charlie

by Elisabeth Piotelat

SETI League Regional Coordinator

When I was a little girl, there were only 3 channels on our TV. The second of them broadcast *Cosmos* and *recreA2*. Carl Sagan showed me the universe. On Wednesday afternoons I watched *recreA2*, waiting for such cartoons as *Captain Harlock* and *UFO Robot Grendizer*. These cartoons were introduced by a singer called Dorothee. While she was singing or speaking, we saw caricatures of her, exaggerating her big nose. They were drawn by a cartoonist named Cabu. He was my nice friend, a kind of brother for all kids in France.

In 2014 I watched the remake of *Cosmos*, presented by Neil DeGrasse Tyson. I read a lot of debate about religion and was surprised. Why is evolution a problem? It's science... I sometimes thought American people are rather crazy. Here in France none of the *Cosmos* episodes was ever discussed or criticized.

Recently, Cabu and 11 other people were killed. Why? Just because they were going on doing the same job as scientists: using the pen (still mightier than the sword) to represent the universe, in a weekly magazine called Charlie Hebdo. It would be very difficult to send any of a Charlie Hebdo's cartoons to ETI, because we would have to explain what a "caricature" is.

I knew that there was a *big* difference between the real Dorothee's nose and the one drawn by Cabu. I understood the meaning of "caricature". I'm not a sociologist; I'm not an economist; I don't have time to travel all over the world to understand what happens in Gaza, Moscow or Baghdad. So I read Charlie Hebdo from time to time. When I subscribed, I received the bath towel seen here:



Of course, there's no cactus at the North Pole. White bears don't read newspapers while sipping ocean water. I would never ask someone to post this image on a spacecraft, like the Pioneer 10 plaque. But, isn't this a rather fair representation of global warming, one of our main problems here on Earth, where we have icebergs, oceans, sand, cactus, and hopefully some white bears?

In 2014, I was that stupid white bear, peacefully reading Charlie Hebdo without being conscious that any of us could disappear within a few days. On the 25th of December, I smiled at Neil DeGrasse Tyson's clever tweets about Newton.

Since the 7th of January 2015, I'm not smiling anymore. I'm hiding my sadness behind "Je suis Charlie". We French people are crazy, because we don't debate evolution or religion. We simply kill. I had no debates about *Cosmos*, because most people I know didn't watch it. My friends on social media share my point of view. We have no debate.

I'm Charlie because I want to provoke, in order to make people doubt. I live near Paris, and want my Muslim and Catholic neighborhood to be motivated to think about Charlie Hebdo's cover, and about intelligent life in the universe. The child I was in 2014 died with Cabu, Charb and the other victims of this senseless violence. My planet Earth is not the same any more. Cognito ergo sum.

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.



TVIW 2014 Photos



Half a dozen SETI League members were among the eighty space travel professionals and enthusiasts gathered in November 2014 at Oak Ridge TN, for four days of study and collaboration at the third Tennessee Valley Interstellar Workshop.

TVIW photo



In Oak Ridge TN at the recent Tennessee Valley Interstellar Workshop, Robert Kennedy (left) presents SETI League executive director emeritus H. Paul Shuch with a copy of "Interstellar Migration and the Human Experience," while Communications session chair Sam Lightfoot looks on.

Paul Gilster photo



At Oak Ridge National Laboratory, mathematician Michael Minovitch, the father of gravity assist acceleration (now used for nearly all interplanetary spacecraft missions), signs his name to one of the Cray modules of the Titan supercomputer.

Patricia Copeland photo



Following the 2014 Tennessee Valley Interstellar Workshop last November, several attendees participated in a tour of the Oak Ridge National Laboratory. ❖

Announcement of the Twenty-First Annual Membership Meeting Sunday, 19 April 2015, Little Ferry NJ

In accordance with Article IV, Section 1 of our duly approved Bylaws, the Trustees of The SETI League, Inc. hereby schedule our Twenty-first Annual Membership Meeting for 1 PM Eastern time on Sunday, April 19, 2015, at the conference room of Eventide, Inc., One Alsan Way, Little Ferry NJ 07643. This office is located adjacent to The SETI League office, one block north of Route 46 and one mile east of the Teterboro Airport, accessed off of Route 46 via Liberty Street to Harding Avenue to Alsan Way. Here is a map, courtesy of MapQuest.



We recommend that out-of-town members and guests flying in commercially use the Newark International Airport (EWR), which is about twenty minutes South of our office. There is a wide variety of hotels available at the Newark Airport. A rental car is recommended. From Newark, drive North on the New Jersey Turnpike to US Route 46 Westbound, cross over the Hackensack River, and two long blocks after the traffic circle, turn right onto Liberty Street.

Our members and guests using General Aviation are invited to use the Teterboro Airport (there *are* landing fees and a security fee). Of the half-dozen Fixed Base Operators offering transient parking, we recommend Atlantic Aviation (ask Ground Control for parking in the Atlantic Midfield). They should be able to assist you with ground transportation, and will waive the ramp fee if you purchase fuel. Please coordinate your schedules and needs in advance through our secretary via email to [heather at setileague dot org](mailto:heather@setileague.org).

As attendance by one percent of the League's membership constitutes a quorum, all members in good standing are encouraged to attend. The preliminary agenda for this meeting, per Bylaws Article XII, appears below.

Per Article IV, Section 3 our Bylaws, written or electronic notice of this Meeting is being provided 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 Old Business and New Business items for inclusion in the Agenda. Please email your agenda items to [paul at setileague dot org](mailto:paul@setileague.org), not later than April 1, 2015. For planning purposes, we would appreciate it if members would also RSVP to our secretary, [heather at setileague dot org](mailto:heather@setileague.org), if planning to attend.

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.

Preliminary Agenda

- Call to Order
- Minutes of 2014 Membership Meeting
- Financial Report
- Committee Reports
- Old Business
- New Business
- Good and Welfare
- Adjournment



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SETI League memberships are issued for the *Calendar Year*. Please check the expiration date indicated on your mailing label. If it reads December 2014 or earlier, you have already expired, and *must* renew your SETI League membership **now!** Please fill out and return this page along with your payment.

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Patron (priority use of The SETI League’s radio telescope)	\$10,000
Director (Patron membership plus seat on advisory board)	\$100,000
Benefactor (a major radio telescope named for you)	\$1,000,000

Annual memberships are issued for the calendar year. Those processed in January through April expire on 31 December of that year. Those processed in September through December expire on 31 December of the *following* year. Those members joining in May through August should remit half the annual dues indicated, and will expire on 31 December of the same year.

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<i>SARA Conference Proceedings:</i>		
2006, 2007, 2008, 2009 (specify)	\$20	\$27
<i>SETI League Technical Manual (CD)</i>	\$10	\$13
<i>Project Cyclops 2nd Edition</i>	\$20	\$30
<i>The Listeners</i> by James Gunn	\$15	\$21
<i>Sing a Song of SETI</i> (Songbook)	\$10	\$13
<i>Sing More Songs of SETI</i> (Songbook)	\$10	\$13
<i>Sing a Song of SETI</i> (music CD)	\$15	\$17
<i>Sing More Songs of SETI</i> (music CD)	\$15	\$17
<i>Demented!</i> (music CD)	\$15	\$17
T-shirts, specify M, L, or XL	\$15	\$22
SETI Nerd Gift Set (one each Mouse Pad, Pocket Protector, <i>Project Cyclops</i> and <i>Tech Manual</i>) at 20% Savings to <u>Members Only</u> :	\$30	\$43

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