



Di-Dah-Dit

Official Newsletter of the Parkersburg Radio Klub
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"Quantum Radio" May Offer New Twist on Communicating in Problematic Environments

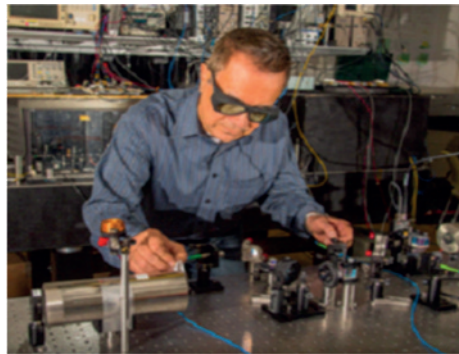
Researchers at the National Institute of Standards and Technology ([NIST](#)) have demonstrated that quantum physics might enable communication and mapping in locations where GPS, cell phones, and radio are not reliable or don't work at all, such as indoors, in urban canyons, underwater, and underground.

NIST [announced](#) the technology advance on January 2. The technology may have marine, military, and surveying applications. The NIST team is experimenting with very-low-frequency (VLF) digitally modulated magnetic signals, which propagate farther through buildings, water, and soil than conventional electromagnetic signals at higher frequencies.

"The big issues with very-low-frequency communications, including magnetic radio, are poor receiver sensitivity and extremely limited bandwidth of existing transmitters and receivers. This means the data rate is

zilch," said NIST project leader Dave Howe, AD0MR.

"The best magnetic field sensitivity is obtained using quantum sensors. The increased sensitivity leads in principle to better range. The quantum approach also offers the possibility to get high-bandwidth communications like a cellphone has. We need bandwidth to communicate with audio underwater and in other forbidding environments," he said.



Physicist Dave Howe, AD0MR, aligns a laser beam to pass through a tiny glass cell of rubidium atoms inside the cylindrical magnetic shield. The atoms are the heart of an atomic magnetometer demonstrated as a receiver for digitally modulated magnetic VLF signals. [NIST photo]

NIST researchers have demonstrated detection of digital-

ly modulated magnetic signals by a magnetic-field sensor that relies on the quantum properties of rubidium atoms. The NIST technique varies magnetic fields to modulate or control the frequency -- specifically, the horizontal and vertical positions of the signal's waveform -- produced by the atoms.

NIST developed a direct current magnetometer that uses polarized light as a detector to measure the "spin" of rubidium atoms in a tiny glass cell induced by magnetic fields. Changes in the atoms' spin rate correspond to an oscillation in the dc magnetic fields, creating alternating current voltages at the light detector that are more useful for communications.

"Atoms offer very fast response plus very high sensitivity," Howe said. "Classical communications involves a tradeoff between bandwidth and sensitivity. We can now get both with quantum sensors," Howe speculated on

an Amateur Radio application.

"The quantum radio is great fun, far better sensitivity than any other receiver, at room temperature, anyway," Howe told ARRL. "The atoms in the gas cell replace the 'antenna' and detection in the classical sense. It would be nice to try modulation in the 2200-meter band using the quantum receiver for detection." In the future, the NIST team plans to develop improved transmitters.



In the NIST tests, the sensor detected digitally modulated magnetic field signals with strengths of 1 picotesla -- one millionth of Earth's magnetic field strength -- and at frequencies below 1 kHz.

The researchers hope to extend the range of low-frequency magnetic field signals by boosting the sensor sensitivity, suppressing noise more effectively, and increasing and efficiently using the sensor's bandwidth.

The NIST strategy requires inventing an entirely new field, which combines quantum physics and low-frequency magnetic radio, said Howe, who told ARRL that ham radio enhanced his in-

terest in communications when he was in ninth grade in New Mexico. "So, it's what guided my interest into applied quantum physics in college. Ham radio was the bigger influence in all ways." Howe retired from NIST last September. He now is a research advisor for NIST and Colorado University.

The 2018 ARRL Repeater Directory --Complete, Comprehensive, and Now Available

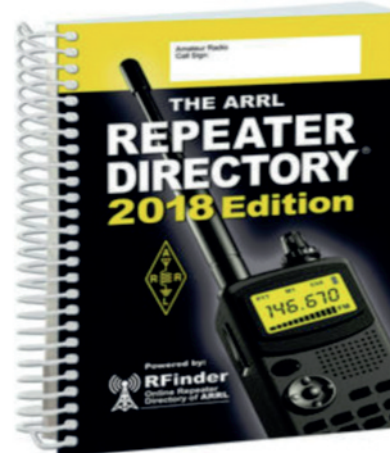
[The ARRL Repeater Directory](#)[®] -- 2018 edition is now available! For decades, *The ARRL Repeater Directory* has been an invaluable source for locating repeater frequencies while traveling. New hams often use the *Repeater Directory* to find local activity after purchasing a new handheld radio. Public service volunteers often keep a copy nearby or in their emergency "go kits."

The 2018 edition is the second to include crowdsourced listings contributed by users, repeater owners, and volunteer frequency coordinators. This means more listings, and updated more often. With 31,000 listings, the *ARRL Repeater Directory*[®] is the most complete printed

directory of on-the-air repeaters, covering repeater systems throughout the US and Canada.

Repeater systems are listed by state/province, city, and operating mode. Digital repeater systems are included: FUSION, D-STAR, DMR, NXDN, and P25 systems. The *Directory* is a convenient 6 × 9 inches and sports a lay-flat spiral binding. *Make it yours!* The cover of the new 2018 edition includes space to personalize your directory. Pages of supplemental information include VHF/UHF and microwave band plans, as well as repeater operating practices.

The [2018 ARRL Repeater Directory](#) is now shipping. Order from the [ARRL Store](#), or find an [ARRL publication dealer](#); ARRL Item No. 0758, ISBN: 978-1-62595-075-8, \$19.95 retail; ARRL member price \$17.95. For additional questions or ordering, call 860-594-0355 (toll-free in the US, 888-277-5289).



PARK Minutes
November 13, 2017

The Parkersburg Amateur radio Klub met at the Western Sizzlin Restaurant for the November meeting.

Before the meeting a video was shown of ham radio contacts with the International Space Station - NA1SS.

Earl KB8HRG discussed the Linux operating system as an alternative to MS Windows.

The meeting was called to order at 7:09 pm by President Jerry Wharton KA8NJW.

Introductions were made by 24 members and guests.

The 50/50 drawing was won by Dave WD8CYV.

The minutes of the October meeting were read and approved and the treasurers report of \$ was given by Jane N8MOW.

UNFINISHED BUSINESS:

Jerry has processed 10 additional QSL requests for the special event operation at Volcano Days with cards and certificates. John W8IDW received one additional request which Jerry will process.

A good turnout was observed at the Parkersburg Ham Fest with several Klub members "unloading" items to attendees.

An inventory of Jim Palmer's K8BOT radio equipment was developed and issued to the membership via email.

Antenna work is still needed by Mark Schauwecker K8IL (K4BDI). Dave WD8CYV and Jerry KA8NJW will visit and determine what needs to be done.

NEW BUSINESS:

The annual Christmas party / December meeting will be held on the regular Tuesday meeting nite December 11. Darlene W8PAN will decorate the room. Jerry KA8NJW will request the entire room for this meeting. Jane N8MOW will request, the barbershop quartet who provided last years entertainment to return.

Ray N8TWV was in attendance after a hospital stay. Bob KB8EFB made a motion with Mike WD8BTI second to adjourn at 7:28 pm.

Minutes recorded by John W8IDW, secretary

PARK Minutes 12/11/17

The Parkersburg Amateur Radio Klub Meeting/Christmas Dinner was held on December 11, 2017 at the Western Sizzlin Steakhouse in Parkersburg.

Members met at about 6:00 pm. for a great meal and companionship. Darlene W8PAN provided door prizes and decorations for just about everyone. My fudge was great!

Then we were treated to a bunch of songs by a Barbershop Quartet invited by Jane M8MOW

Meeting was called to order at 7:00 Introductions were made by 27 members and guests.

The 50/50 drawing was won my Jim Caplinger NE8FFX for \$18.00.

A treasurers report was made by Jane, N8MOW

New Business:

Thanks was offered for all who helped make the Night a success.

There was no old business

Motion to adjourn was bade by Bob KB8EFB

So Moved at about 7:20.

Minutes by Mary

**PARK Minutes
January 8, 2018**

The Parkersburg Amateur radio Klub met at the Western Sizzlin Restaurant for the January meeting.

Before the meeting a video was offered by Jerry Wharton KA8NJW on digital formats. Video was skipped due to low interest by membership.

The meeting was called to order at 6:57 pm by President Jerry Wharton KA8NJW.

Introductions were made by 18 members and guests.

The 50/50 drawing of \$7.50 was won by Brenda Lyons.

The minutes of the December meeting (recorded by Mary Wharton) were read and approved and the treasurers report was given by Jane N8MOW.

UNFINISHED BUSINESS:

John W8IDW gave Jerry KA8NJW a received Mountwood special event QSL request to process.

NEW BUSINESS:

SCARF organization will hold its annual hamfest at Nelsonville on Sunday 1/14/18.

Mike WD8BTI made a motion for the Klub to purchase a "pop-up" canopy when the spring season makes them generally available. Motion passed with a general price of \$100, and Mike to make purchase. Canopy to be used for outside operating events such as field day or special operations.

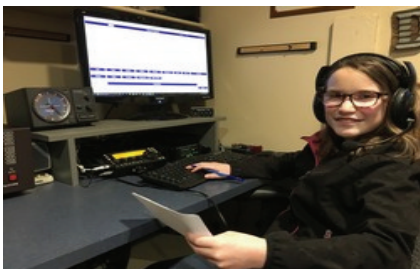
Curt K8UC related an enjoyable 40m QSO he had with a disabled Vet.

Bob KB8EFB made a motion with Jane N8MOW second to adjourn at 7:17 pm.

Minutes recorded by John W8IDW, secretary
List of attendees on the reverse.

Thousands Getting Their Grids On!

And they're off! New Year's Day January 1 (UTC) marked the opening day for the ARRL International Grid Chase 2018 (IGC). Among those hitting their grids running was newly minted General-class operator Katie Thompson, K17HCX, of Mt. Vernon, Washington, who used the occasion to embark on the Chase *and* to get on HF for the first time using her own call sign. The 11-year-old comes from a ham radio family. Her dad, Todd, is W7TAO, while her older brothers are Mason, K7MWT, 15 -- who upgraded to Amateur Extra at the examination session where his sister upgraded to General -- and Tanner, K7TMT, 13.

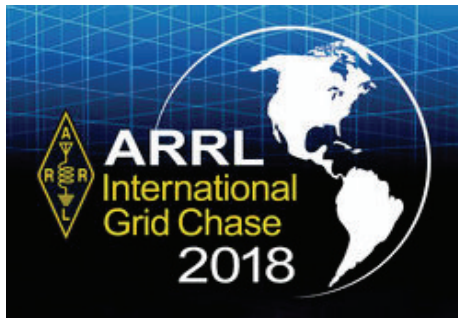


Katie Thompson, K17HCX. [Todd Thompson, W7TAO, photo]

"She called CQ Grid Square Chase on 20 meters and very quickly made 44 contacts," her dad told ARRL. "She was very excited to work her first pile-up and even had two Japanese stations QSO with her. She's anxious to continue participating in the grid square chase." Todd Thompson said all three young radio amateurs are looking forward to participating in [Rookie Roundup](#) in April.

The IGC is off to a rousing start, with some 6,400 participants from around the globe already showing up on the [Leader Board](#) as of the morning of January 4. Point totals for the International Grid Chase are shown for confirmed contacts only, and, while the leader boards are not based on real-time data, they are updated several times a day. All contacts on all bands except 60 meters are valid for Grid Chase credit, provided both stations upload their logs to Logbook of The World ([LoTW](#)) and get a match.

The objective of the year-long event is to work stations in as many different Maidenhead grid squares as possible, and then upload your logs to [LoTW](#).



Each new grid square contact confirmed through LoTW will count toward your [monthly total](#). Stations do *not* have to exchange grid squares for a valid contact, although it's anticipated that many operators will do so. Some rare grid squares will be in demand. How about yours? Get on the air, and get behind *your* grid! If you can, get out there, and activate the scarce ones.

Members of the Marconi Cape Cod Radio Club [KM1CC](#) at the Cape Cod National Seashore will activate rare grid square FN51 January 18-19 for the International Grid Chase.

Complete details of the ARRL International Grid Chase 2018 appeared in

the December 2017 issue of QST. For more information, [contact](#) the ARRL Contest Branch.

Second Annual AM Rally Special Event Set for February 2-4 Weekend

The second-annual [AM Rally](#) is inviting operators to explore the original phone mode over the February 2-4 weekend. Co-sponsor Clark Burgard, N1BCG, said the event "is intended to be both fun and educational." It encourages all radio amateurs to get on AM, possibly for the first time.

"Because of resurgent interest in AM, the event is also an opportunity for amateurs new to AM to learn about proper settings and get the most performance out of their station, whether it's modern, vintage, tube, transistor, software-defined, military, boat anchor, broadcast, home brewed, or commercially made," Burgard said.



The [AM Rally website](#) includes tips and suggestions for various transmitter types as well as links to additional information. Certificates will be awarded for most states contacted and most contacts overall made by stations in five power-output classes. Some "special recognitions" will be made on an ad hoc basis, Burgard said.

The AM Rally gets under way at 0000 UTC on Saturday, February 3, and concludes at 0700 UTC on Monday, February 5. Band include 160, 80, 40, 20, 15, 10, and 6 meters.

The 2017 AM Rally, which was held in April, was deemed [a huge success](#), with nearly 1,500 contacts reported on the 72 logs submitted.

Radio Amateur's Invention to Treat Alzheimer's Patients Going to Clinical Trials

Inveterate inventor and radio amateur Eric Knight, KB1EHE, may be on the cusp of medical history as a device he developed in collaboration with a prominent Alzheimer's disease researcher enters clinical trials this month. Both are hoping that the device, which essentially saturates the brain with low levels of RF, may prove to be a viable treatment for the dreaded disease affecting millions.

"Sometimes breakthroughs happen in ways that are unexpected," Knight told ARRL.

Knight learned of experiments that world-renowned Alzheimer's researcher Dr. Gary Arendash was carrying out on mice specially bred to have the disease, exposing them to low levels of RF. Knight said the effects were dramatic, sometimes even reversing the disease's effects in the mice. Borrowing some concepts from his early experiments with small rockets and avionics, he set about developing, and later patented, a device that could provide the requisite RF exposure to the human head.

"In the early 2000s, we were trying to figure out then how to make antennas that would wrap around the airframes of the rockets we were designing," he said, noting that the diameter of his group's space vehicle was about the same as that of a human head. Knight learned that Arendash was attempting to extend his investigations in a similar vein, and eventually they collaborated.

"He came at it from mice and science, I came at it from an aerospace and hobby perspective," said Knight, who patented a device based on a bicycle-type helmet. At the same time, Arendash was developing a similar wearable -- a fabric cap resembling an old-time aviator's headgear. Both devices are embedded with small antennas to bathe the brain in electromagnetic radiation in the 900 MHz spectrum set aside for

Industrial, Scientific, and Medical (ISM) applications -- some 100 MHz higher than a cell phone's frequency.

"Ironic for sure," Knight said. "Who would imagine that cell phone radio waves could be a potential treatment for Alzheimer's disease?"

Knight, who has no medical background, said the device to be used in the clinical trials consists of the cap plus a palm-sized transmitter and wiring harness worn on the arm. The resulting combination has been dubbed the NeuroEM 1000. Participants will get doses of RF twice a day.

From the Food and Drug Administration's (FDA) standpoint, the clinical trials aim primarily to show that the technology is safe, but Knight said he and Arendash are also looking for data that might demonstrate that the device could be beneficial in treating Alzheimer's. The protocol they've developed goes further than what the FDA requires and includes before-and-after baseline data, with cognitive testing, assays of spinal fluid and blood, and PET scans.



"The hope is that there is a tiny bit of efficacy. Then we can work to refine it," Knight said, adding, "No one is expecting a magic cure"

Radio Anniversaries Abound in December

December is the month in which three notable events in radio history occurred -- the first radio

transmission heard across the Atlantic Ocean in 1901, the first broadcast of the human voice and music in 1906, and the first successful transatlantic Amateur Radio HF transmissions in 1921.



Marconi at Signal Hill in Newfoundland

On December 12, 1901, Italian wireless pioneer Guglielmo Marconi succeeded in receiving the first transatlantic radio signal, transmitted from Poldhu, in Cornwall, England, to St. John's, Newfoundland, Canada. Marconi's team in Cornwall transmitted the letter "S" in Morse code, and this was heard by Marconi and his assistant George Kemp at a facility set up in Cabot Tower on Signal Hill in St. John's. On the Cornwall side, Marconi had erected a powerful spark-gap transmitter feeding a massive antenna. The receiving team used a kite antenna. The experiment proved that radio signals could be transmitted beyond the line of sight, opening the door to global wireless communication.

An article in the December 2007 issue of QST suggested that absorption may have been less in 1901 than in the 21st century, perhaps contributing to the success of the feat, which occurred during daylight on the Canadian end.



Reginald Fessenden.

On Christmas Eve 1906, experimenter Reginald Fessenden made what may have been the first radio broadcast to include speech and music. The transmission originated at Brant Rock, Massachusetts, about 30 miles from Boston.

As he's done in year's past, Brian Justin, WA1ZMS, of Forest, Virginia, will commemorate that first audio broadcast by operating W12XLQ on 486 kHz this month, marking the 111th anniversary of the Fessenden's accomplishment. Historic accounts say Fessenden played the violin -- or a recording of violin music -- and read a brief Bible verse, astounding radio experimenters and shipboard operators who heard the broadcast.

"Since we now have a ham band on 630 meters, I will have a shorter transmission period this year that will only cover the Christmas holiday," Justin told ARRL. That's because he hopes to be active on the new band himself.

Justin will begin his transmission on December 24 at 1700 UTC and continue until December 26 at 1659 UTC. For his transmitter in 1906, Fessenden used an ac alternator modulated by placing carbon microphones in series with the antenna feed line. Justin's homebuilt station is slightly more modern, based on a 1921 vacuum tube master oscillator power amplifier

(MOPA) design, using a UV-202 tube. The transmitter employs Heising AM modulation, developed by Raymond Heising during World War I.

[Send](#) listener reports directly to Brian Justin, WA1ZMS.

In 1921, ARRL sponsored two series of transatlantic tests to see if signals from previously qualified Amateur Radio stations could be heard at a receiving station in Ardrossan, Scotland. The second series succeeded, with several ham stations heard on the receiving end, using equipment far superior to what had been available to Marconi just 20 years earlier. "[The Story of the Transatlantics](#)" chronicled the events in the February 1922 issue of *QST*, to great fanfare. As Mike Marinaro, WN1M, recounted in "[The Transatlantic Tests](#)," in the May 2014 issue of *QST*, the first signal "unofficially" heard in Scotland was actually that of a pirate, identifying as 1AW and not using the prearranged transmission format.



Paul Godley, 2ZE.

The "rough listening post" in Scotland, staffed by receiver designer Paul Godley, 2ZE, and D.E. Pear-

son of the Marconi Company, was equipped with a superheterodyne and regenerative receiver connected to a 1,300-foot Beverage antenna, 12 feet above ground.

On December 10, the CW signals of official entry 1BCG, owned by Minton Cronkhite, "were solidly heard on 230 to 235 meters," Marinaro wrote in 2014. "This signal derived from the specially designed and constructed station of the Radio Club of America at Greenwich, Connecticut -- the only station heard that morning."

Connecticut radio amateur and radio history buff Clark Burgard, N1BCG, will be among those celebrating the 96th anniversary of the first transatlantic shortwave transmission in Greenwich, Connecticut. Several other stations will take part by establishing contacts between the US and Europe, including GM7VSB in Ardrossan, Scotland.

No specific bands and frequencies were set in advance, in order to "permit flexibility due to propagation." Burgard has posted [additional information](#) on his QRZ.com profile page.

Chris Codella, W2PA, provides [additional radio history](#) on his "Ham Radio History" website.