

# THE PLATTSMOUTH AMATEUR RADIO CLUB

# Communicator

# February 2018

## “Quantum Radio” May Offer New Twist on Communicating in Problematic Environments

(ARRL 01/05/2018) 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.

NIST researchers have demonstrated detection of digitally 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

*(Continued on Page 3)*

## Radio Amateur Receives Patent for “Cloaking” Technology

(ARRL 12/28/2017) Nathan “Chip” Cohen, W1YW, of Belmont, Massachusetts — the founder of Fractal Antenna Systems Inc and inventor of the fractal antenna — has been granted a patent for deflective electromagnetic shielding — essentially “cloaking” technology to defend against detection by radar and similar technologies.

“Ham radio experimentation can lead to some pretty cool innovations!” Cohen said in response to a recent QRZ forum post about the patent. “Let's keep that spirit alive in 2018.”

The patent covers electromagnetic cloaking/deflection of, among other things, satellites, rockets, towers, antennas, vehicles, body coverings, ships, spacecraft, and even people.

“Much time and effort has been devoted to the quest for so-called invisibility machines,” the patent's background information states. “Beyond science fiction, however, there has been little, if any, real progress toward this goal.”

According to the detailed description, the technology “provides one or more surfaces that act or function as shielding and/or cloaking surfaces for which at least a portion of the surface includes or is composed of ‘fractal cells’ (small fractal shapes, functioning as antennas or resonators) placed sufficiently close to one another, so that current present in one fractal cell is replicated or reproduced to an extent in an adjacent fractal cell. Without being limited by any theoretical explanation, surface plasmonic waves are believed to cause such replication in conjunction with evanescent waves.” The resulting surface would deflect around an object.

*(Continued on Page 3)*

## Meeting Calendar

Dinner on Sunday, Jan. 28, 2018

5pm at Famous Dave's

8am, February 24, 2018

8am, March 31, 2018

at Mom's Café

**2017  
PAID MEMBERSHIP**

- AGØL.....Steve Loyd [E]
- AIØN.....Chuck Engberg\* [E]
- K3CRF .....Dave Smith [E]
- K5LBS.....Jerry Gault [E]
- KA0IJY ..... Keith Keene [E]
- KBØFSI .....Pat McCollum [T]
- KBØOGO ..... Roger Behrns\* [E]
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- KCØDTK..... Joan Bellairs [T]
- KCØHYD.....John Titsworth [G]
- KCØHYE.....Shirley Titsworth [T]
- KDØNMD.....Dudley Allen [G]
- KEØBXB ..... Kim Allen [T]
- KEØXQ..... Bill McCollum [E]
- KGØKR ..... Beth Engberg\* [E]
- KIØPY .....Kevin Faris [E]
- N5SEZ ..... Ray McNally[E]
- NØLZH .....John Harrington[T]
- WØDBW.....Derek Winterstien [G]
- WØZY .....Dave McLaughlin[E]
- WØZYD .... Debbie McLaughlin[G]

*\*Charter Members #New Ham*

Note: Thanks to all who have paid their dues and many who have given additional donations. All donations are greatly appreciated. Please let me know of any corrections.

**Meetings are 8am the last Saturday of most months at Mom's Café in Plattsmouth.**

**Tuesday night get-togethers at Plattsmouth Burger King at 7 PM**



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**Repeaters:**

443.45<sup>+</sup> is located in downtown Omaha  
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**Web Site**  
**www.kb0smx.com**  
 Maintained by Derek (WØDBW)

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**MINUTES of  
the  
MEETING**

The November 25, 2017 meeting was held at Mom's Café in Plattsmouth. The meeting was called to order at 0820 by President Roger Behrns

Those in attendance were Roger (KBØOGO), Kevin (KIØPY), Ray (N5SEZ), Derek (WØDBW) and Lisa, Keith (KA0IJY), Steve (AGØL), Dave (WØZY), and John (WR5I).

The Minutes of the October meeting were approved on a motion by Kevin and second by Steve.

The treasurer reported receiving \$15 in dues this month and no expenses which leaves \$260 in the repeater fund and \$720.35 in the general fund for a balance of \$980.35.

It was noted that a surprise 80th birthday party for Bill W3DCQ was being hosted by his family on December 26 at Godfathers and everyone was invited.

The meeting adjourned on a motion by Steve and second by Kevin at 0826.



Everyone is invited to the Annual Dinner. You do not have to be a member or even be a ham. Bring a friend who is interested. Sunday January 28, 2018 5 pm at the party room at Famous Dave's Order off the menu. It's a great chance to visit friends or make new ones.

**PLATTSMOUTH ARC MEMBERSHIP REGISTRATION FORM**

Name		Call Sign	Class
Address	City	State	Zip
E-Mail		Phone #	
Spouse Name		Call Sign	Class
Membership Type <input type="checkbox"/> Primary(\$15) <input type="checkbox"/> Spouse (\$5) <input type="checkbox"/> Student (\$5) <input type="checkbox"/> New Ham	● Additional donations are gratefully accepted. ● New Hams are free during the year they receive their first license. ● Please give this form and dues to the club treasurer or any club officer.	Donation for: <input type="checkbox"/> Repeater fund <input type="checkbox"/> Insurance <input type="checkbox"/> Other _____ <input type="checkbox"/> General	Amount:  <input type="checkbox"/> I prefer my donation to be anonymous.
Any additional e-mail or cell phone #s?			

*Quantum* (Continued from Page 1)

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.

To further improve performance, the NIST team is building and testing a custom quantum magnetometer. Like an atomic clock, the device will detect signals by switching between atoms’ internal energy levels as well as other properties, Howe said. 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, Howe said.

<http://www.arrl.org/news/quantum-radio-may-offer-new-twist-on-communicating-in-problematic-environments>

<https://www.nist.gov/news-events/news/2018/01/quantum-radio-may-aid-communications-and-mapping-indoors-underground-and>

## Norway Completes Transition to Digital Audio Broadcasting

(ARRL 12/14/2017) Norway has completed a nearly year-long transition to digital radio, becoming the first country in the world to shut down national broadcasts of its analog FM radio network and move to Digital Audio Broadcasting (DAB). The three state-run outlets — NRK P1-P3 — and commercial stations P4 and Radio Norge have ceased broadcasting in FM and transmit DAB instead.

The switch has not been popular with everyone, with complaints involving technical issues and lack of DAB coverage in Norway. In addition, radio users have complained about the need to buy new receivers or digital adapters. Also, fewer than one-half of Norway’s motorists have DAB capability in their vehicles.

Proponents contend the transition not only will offer better sound quality and more channels but save money.

Radio listening in the Scandinavian country has dropped by 10% over the past year, and public broadcaster NRK has lost 21% of its audience, according to media reports.

The switchover to DAB+ involves only national radio channels; most local stations still broadcast in analog FM. Other countries in Europe are poised to follow Norway’s lead. Finland launched digital broadcasting in 1998 but shut it down 7 years later.

<http://www.arrl.org/news/norway-completes-transition-to-digital-audio-broadcasting>

*Cloaking* (Continued from Page 1)

In terms of backscatter, upon which radar systems depend, Cohen has explained it this way: “The incoming wave reflects off a boundary condition at the object. Its reflection is out of phase and phase-cancels with the incoming wave. Bye-bye, backscatter.”

Fractal Antenna Systems first publicly demonstrated “person invisibility” in 2012 for a Radio Club of America audience. He also has demonstrated invisibility cloaks at Hamvention® and at the ARRL New England Division Convention. According to the company’s BusinessWire release, “Uses of the newly patented technology extend to commercial needs such as towers, antennas, people, and shielding, but it may also be used in defense and intelligence arenas.”

According to the BusinessWire release, the technology “produces the desired effects without any requirements on special orientation, composition, or shape of the object. The cloak/deflector can be very thin, and the effect can happen over a wide bandwidth.”

The company noted that “cloaking” applications concentrate on microwave and infrared wavelengths, “although the technology and patents apply to visible light as well.” Stated Cohen, “Cloaking at visible light has limited needs. Camouflage and projection methods are easier and cheaper at making something disappear to the eye. But at radio and heat wavelengths, the cloaking technology is an important enabler.”

Cohen, 62, applied for the patent in 2012. An ARRL Life Member and active DXer, he has been a radio amateur for more than 50 years.

<http://www.arrl.org/news/radio-amateur-receives-patent-for-cloaking-technology>

<http://patft.uspto.gov/netahtml/PTO/srchnum.htm> (Search for #9,847,583)

<https://www.businesswire.com/news/home/20171219005842/en/Unclashed-New-Patent-Illuminates-Applications-Invisibility>

## Nebraska QSO Party

Chapter 25 of the QCWA will again host the 2018 Nebraska QSO Party on the weekend of April 21/22, 2018.

The QSO Party will begin at 1300z (0800 CDT) on Saturday the 21st.

Check out the following website for the rules and more information: <http://www.qcwa.org/chapter025.htm>

## Lincoln Hamfest ARRL Nebraska State Convention

Lancaster Event Center  
84th and Havelock Ave., Lincoln, NE

Saturday, March 10, 2018  
9:00am – 2:30pm

Check out the website for information on forums and presentations, vendors and VE sessions.

<http://www.lincolnhamfest.org/>