STARLITE

THE NEWSLETTER FOR THE STOURBRIDGE AND DISTRICT A.R.S.

G6OI
G6SRS

G4CVK

ISSUE: DECEMBER 2018

STOURBRIDGE & DISTRICT AMATEUR RADIO SOCIETY
INCORPORATING
OLD SWINFORD HOSPITAL SCHOOL RADIO CLUB

MEETINGS HELD AT

OLDSWINFORD HOSPITAL SCHOOL
HEATH LANE
STOURBRIDGE
[8:00 TO 10:00 PM]

VISITORS ALWAYS WELCOME

THE SOCIETY HOLDS ITS FULL MEETINGS
ON THE 1ST AND 3RD MONDAYS EACH MONTH

80TH ANNIVERSARY YEAR

[MARCH 2018 - MARCH 2019]

RSGB AFFILIATED SOCIETY

The views expressed in STARLITE may not be those of the Committee – Stourbridge and District Amateur Radio Society

STARLITE

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http://g6oi.ross-lewis.co.uk/index.html

StARS Facebook Page:-
https://www.facebook.com/groups/stourbridge.ars/

Forthcoming Meetings

December 3rd	On Air. Informal. Digi Modes Group.
December 10th	**StARS Annual Dinner @ Dilshad Balti, Oldswinford**
December 17th	Main Meeting – Subject tba.
December 24th	On Air. Informal. Digi Modes Group.
January 7th 2019	On Air. Informal. Digi Modes Group.
January 14th 2019	On Air. Informal. Digi Modes Group.
January 21st 2019	Main Meeting – Subject tba.
January 28th 2019	On Air. Informal. Digi Modes Group.
February 4th 2019	On Air. Informal. Digi Modes Group.
February 11th 2019	On Air. Informal. Digi Modes Group.
February 18th 2019	**Constructors' Competition**
February 25th 2019	On Air. Informal. Digi Modes Group.
March 4th 2019	On Air. Informal. Digi Modes Group.
March 11th 2019	On Air. Informal. Digi Modes Group.

Editor's Comment

Well, I have nothing to comment upon this month.

I've received nothing from the membership or committee, which doesn't surprise me.

The only item I did receive was from Gordon GØTZV, which includes a couple of You Tube links for the G5RV Dipole and I include them as page-fillers.

So, to fill this page, I wish you all …….

G5RV Multi Band HF Dipole

https://www.youtube.com/watch?v=aeNHIQ_j4Dk&feature=youtu.be

This is a video about the G5RV Multi Band HF Dipole presented to the Brandon Amateur Radio Society (BARS) in Brandon, FL on May 18, 2017. It looks at the performance of a G5RV design on the HF Amateur Radio Bands using computer modeling.

The Amazing Doublet Dipole G5RV!!! Best Stealth Backyard Antenna!

https://www.youtube.com/watch?v=rvBuzQT8zsc&feature=youtu.be

The doublet antenna is a form of dipole that uses a balanced feeder, often open wire feeder and an antenna tuning unit. As open wire feeder is able to operate with levels of standing waves and effectively becomes part of the antenna, it is able to operate over a wide band of frequencies. As a result, the doublet antenna forms a very convenient multiband antenna and it is often used at HF where a number of different HF bands need to be covered, and it is relatively popular with radio amateurs where it enables several bands to be used with a single antenna.

Doublet antenna basics
The doublet antenna is essentially a balanced system and each half of the top plus each wire in the feed line must be equal in length. The antenna top is not cut to resonate at any particular frequency (unlike the half-wave dipole), and any length may be chosen to suit an individual location.

Basic doublet antenna concept
Basic concept of a doublet antenna The key to the doublet antenna is the form of feeder used. Open wire or balanced feeders are able to operate as part of the actual antenna itself, not just feeding the power from an unbalanced source. The balanced feeder or open wire feeder is able to operate with standing waves along its length.

Note on Balanced Feeder:
Balanced feeder can come in one of a variety of forms: open wire, ladder line, or simple ‘ribbon feeder’. It provides the capability for very low loss, provided it does not pass near other objects that might cause imbalanced. Balanced feeder is often used on the HF bands.

Read more about Balanced Feeder.
Standing waves are a feature of radiating wires, but in the case of the open wire feeder, it consists of two equal length close spaced wires. As these carry equal and opposite currents their radiation cancels. However the feeder still remains part of the overall antenna itself.

For a doublet, the top section is typically a minimum of λ / 4 for each section (length L1), i.e. a total length across the top of λ /2. However, it is found that the top section, i.e. 2 x L1 can be reduced to about 3 λ / 8 without any major reduction in performance - it has about 98% of the efficiency of a half wave dipole, so the difference will not be noticed.

The doublet antenna can operate over a wide range of frequencies and as a result the radiation pattern will change according to its electrical length with respect to the number of wavelengths, or part of that it represents. As the electrical length increases, i.e. as the frequency increases the antenna increases in the number of wavelengths it represents although the physical length remains the same. As the electrical length increases, so the phasing of the fields around the radiating element mean that the radiation changes from a figure of eight pattern for a half wave top radiating element to a pattern that has lobes that increasingly move towards the axis of the doublet antenna.

Doublet feeder & operation
The feeder can be either open wire or what is termed ladder line. This can be either 300Ω or 450Ω. Also the length of the feeder can be cut meet the requirements of the installation.

When feeding an antenna of this type it is found that it can present an impedance over a wide range. Accordingly it is necessary to use an antenna tuning unit to ensure that the transmitter itself is presented with the required impedance. This can be measured using an SWR meter.

Basic doublet antenna showing ATU with balanced input
Doublet antenna showing use of ATU with balanced antenna connection The antenna tuning unit used should be able to match impedances over a wide range, and it must also have a balanced output connection. If it does not, then an external balun is required so that the unbalanced to balanced transition is present.

Baluns can be bought or made.
Essentially they are simple in their construction provided that the right components and tools are available. Particularly key is the former on which the balun is wound. Typically this is a torroid and it must have the required RF properties and RF power handling capability. Often a balun for a doublet antenna may be a 4:1 ratio providing a 300Ω output to the antenna for a 75Ω input. This provides an adequate match for many ATUs with only unbalanced output connections.

Direct connection to coax
Although it is always best to use an antenna tuning unit with a doublet antenna, it is possible to arrange the antenna so that this may not always be needed.

Although any length of balanced feeder can be used with the doublet, the impedance match is best if the total length of one leg of the antenna and feeder, i.e. L1 + L2 equals an odd multiple of electrical quarter wavelengths of the frequency to be used. Using this approach the impedance, around 50Ω is low and mainly resistive.

Top Secret: QRP Tips …... for QRPers Only

I am going to share a few secrets with you, but you have to promise not to share them with the QRO crowd. So place your hand on the Altoids (or *Strepsils* in the UK) tin and swear "*I will not share anything read here with non-QRPers*." Anthony A. Luscre K8ZT.

Why is this column top secret? Well, I am going to tell you some ways that you can successfully compete with the kilowatters in getting contacts. If these were to fall into the wrong hands, you might not stand a chance in that next pile-up.

Following are some tips that have worked for me and other QRPers over the years.

Sometimes you might use just one, other times you may find combining two or more brings success. The tips are divided into three main groups.

1) Timing-

- **Be There First** Probably the most effective technique for making contacts is to be the first station to hear and then be heard by the target station. The way to do this is spend quality listening time on the right bands at the right time (plus luck).

- **Be The Only One There** Even rare DX stations or busy contesting stations have slower periods. Your task is to be there then. When exactly are these times: the last portion of a contest, just when the band is beginning to open or close, when a station has just QSYed, when a contest station is fighting another station for the frequency and the random times (found by listening over a long period of time for just that right minute.)

- **Get in the Rhythm** Time your response so you are heard in the crowd. Techniques can include: quickly sending your call, delayed calling, tail ending, varying the number of times you repeat your call, varied pacing and emphasis. Listen to see what rhythm the successful stations are using, and then follow suit.

2) Be Heard Above the Din-

- **Being The Loudest Station** is usually difficult when other stations are running 200 times your power, so you need to use your signal effectively. This is where having good antennas with high gain aimed at the target can help.

- **Make Sure Your Signal "Sounds Good"** CW- make sure your keying waveform is optimal with no key clicks. Use a quality keyer with paddles/keyboard and make sure they are adjusted properly. Use good spacing and character weighting. Match your speed to the other station's sending. Phone- use an effective microphone. DXing or Contesting mic elements place emphasis on a specific range of frequencies that can make your signal stand out. Use speech processing properly and/or sparingly.

• **Be On the Right Frequency** Learn how to zero beat the other station's signal. Sometimes you need to be on a different frequency than that of the target station. Listen to the stations that are being worked and zero beat them instead, then use your RIT to listen to the target station. You can try varying your frequency slightly above or below the crowd to make your signal stand out.

• **Speak the Language of Your Target** Learn a few key words and numbers in the native language of the operator you are trying to work.
http://www.ce5ja.cl/wp-content/uploads/2014/07/Radio_Amateur-Conversation_Guide.pdf

Choose The Right Call Sign You may want to use the vanity call sign system to select a new call sign that is more effective in being heard and correctly copied by others.

3) Operating-

• **Get on the air!** More time on the air can definitely increase your chances, especially if you know when and where to hang out.

• **Know Your Equipment** Read the manual and learn the operation of all the features of your rig(s). I know this might seem like a waste of time, but believe me when you want to work that rare DX station and it is the last hours of operation just before they leave the island and they are working split and you not sure how to do it with your rig you will care! Pay special attention to sections on: working split, RIT, XMIT, filter selection, DSP, mic gain and speech processor.

• **Learn From Others** It is very helpful to listen for effective operators and then mimic their style. Even better is finding a person or group of operators that you can observe in action in person. Field Day and other multi-operator events are good chances to learn from others.

• **Experience a Pile Up From the Other End** It is very eye opening to be on the other side of the pile up. You quickly learn which stations stand out in the crowd. You get to hear the whole range from very good to very bad operators. Although it can be prohibitively expensive for many hams to travel to a rare DX location, there are many other ways to get on the other side of a pileup. You can be the operator for a special event station, travel to a rare state for ARRL Sweepstakes (DE, ND, WY, SD or VT), travel to a DX country close to home XE, C6, CY0, CY9, FP, etc., or drive to rare CQ Zone 2 for the CQ World Wide contests.

• **Practice, Practice, Practice** I know it sounds trite, but the best way to become an effective operator is to practice. See what works and improve or change things that don't work, then practice some more.

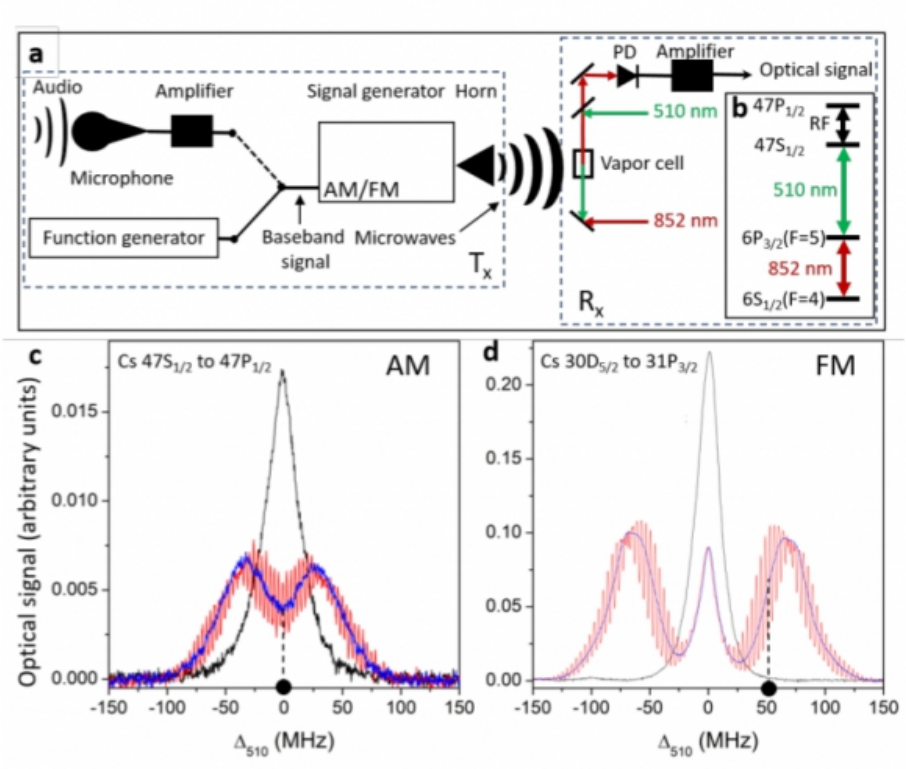
Get ready for atomic radio

Using a laser to detect the effect of radio waves on certain atoms is the basis for a new kind of antenna that resists interference and can receive a wider range of signals.

•By Emerging Technology from the arXiv September 4, 2018

The basic design of the radio antenna hasn't changed in a century. The antenna is usually a set of metal rods roughly half the size of the wavelength they are designed to receive. The electric field in a passing radio wave accelerates electrons inside these rods, converting energy from the wave into a tiny electrical current that can be amplified.

But physicists would dearly love to make antennas more capable and more secure. It would be good, for example, if simple antennas could receive a wider range of wavelengths and be more resilient to electromagnetic interference.



Enter David Anderson at Rydberg Technologies in Ann Arbor, Michigan, and a couple of colleagues, who have reinvented the antenna from scratch. Their new device works in an entirely different way from conventional antennas, using a laser to measure the way radio signals interact with certain types of atoms.

The secret sauce in the new device is Rydberg atoms. These are caesium atoms in which the outer electrons are so excited that they orbit the nucleus at great distance.

At these distances, the electrons' potential energy levels are extremely closely spaced, and this gives them special properties. Indeed, any small electric field can nudge them from one level to another.

Radio waves consist of alternating electric fields that readily interact with any Rydberg atoms they come across. This makes them potential sensors.

But how to detect this interaction? A gas made of Rydberg atoms has another property that turns out to be useful—it can be made transparent by a laser tuned to a specific frequency. This laser essentially saturates the gas's ability to absorb light, allowing another laser beam to pass through it.

However, the critical frequency at which this happens depends crucially on the properties of the Rydberg atoms in the gas. When these atoms interact with radio waves, the critical frequency changes in response.

That's the basis of the radio detection. Anderson and co create a gas of caesium atoms excited into Rydberg states. They then use a laser tuned to a specific frequency to make the gas transparent.

Finally, they shine a second laser through the gas and measure how much light is absorbed, to see how the transparency varies with ambient radio waves.

The signal from a simple light-sensitive photodiode then reveals the way the radio signals are frequency modulated or amplitude modulated.

And that's it: an antenna consisting of a cloud of excited caesium atoms, zapped by laser light that flickers in time to any ambient radio waves. They call it atomic radio.

Anderson and co have put their device through its paces using microwaves and say it works well. "We demonstrate an atom-based receiver for AM and FM microwave communication", they say.

Among its advantages over conventional antennas is the huge range of signals it can detect—over four octaves from the C band to the Q band, or wavelengths from 2.5 to 15 centimetres The antenna itself is a small vapour cell that can create and hold caesium gas excited into Rydberg atoms.

But perhaps most revolutionary is that the detection does not involve conventional radio circuitry. "The atomic radio wave receiver operates by direct real-time optical detection of the atomic response to AM and FM baseband signals, precluding the need for traditional de-modulation and signal-conditioning electronics," say Anderson and co.

That means the device should be more or less insensitive to the kind of electromagnetic interference that can render conventional antennas useless.

To test the device, the team have used it to receive AM and FM microwave signals of a recording of a human voice singing "Mary Had a Little Lamb." "The demonstrated atomic radio exhibits good performance over the entire human audio band," they say.

The new antenna is not perfect. For example, its dynamic range is a little less than usually expected over radio. But the team is optimistic that it can be significantly improved.

Atomic radios are on their way.

Ref: arxiv.org/abs/1808.08589 : An Atomic Receiver for AM and FM Radio Communication

Scientists uncover new battery chemical with 50 percent more storage capacity

Development could change future smartphone, laptop and car battery technologies.

Scientists have found a way of using alternative metals in lithium-based batteries that might not only help relieve the issues associated with conflict materials, but also offer more storage capacity in future devices.

The research team, led by professors at the University of California, Berkeley www.berkeley.edu/ managed to build lithium cathodes with 50 per cent more storage capacity than conventional materials – potentially enabling batteries to be made that can last considerably longer between recharges than current battery technology.

This could change how we use technology in the future as these batteries are used in phones, laptops, tablets and even some cars.

It is also a potentially important step environmentally as lithium-based batteries currently use more than 50 per cent of all cobalt produced in the world, of which around half comes from the Democratic Republic of the Congo, where it's largely mined by hand - in some instances by children.

For the first time we have a cheap element that can do a lot of electron exchange in batteries. "We've opened up a new chemical space for battery technology," said the University's professor in the Department of Materials Science and Engineering and senior author of the report, Gerbrand Ceder, www.sciencedaily.com/releases/2018/04/180411131623.htm "For the first time we have a really cheap element that can do a lot of electron exchange in batteries."

The study has been published in the April edition of the journal Nature and is a collaboration between scientists at UC Berkeley, Berkeley Lab, Argonne National Lab, MIT and UC Santa Cruz www.nature.com/articles/s41586-018-0015-4

"To deal with the resource issue of cobalt, you have to do away from this layeredness in cathodes," Ceder added. "Disordering cathodes has allowed us to play with a lot more of the periodic table."

In the new study, Ceder's lab shows how new technologies can be used to get a lot of capacity from a cathode.

In the world of batteries, this is a huge improvement over conventional cathodes

Using a process called 'fluorine doping', the scientists incorporated a large amount of manganese in the cathode. Having more manganese ions with the proper charge enables the cathodes to hold more lithium ions, thus increasing the battery's capacity.

"In the world of batteries, this is a huge improvement over conventional cathodes," said lead author Jinhyuk Lee, who was a postdoctoral fellow at Ceder's lab during the study.

The new lithium alternative technology needs to be scaled up and tested more to see if it can be used in applications like laptops or electric vehicles, however.

But Ceder says whether this technology actually makes it inside a battery is beside the point as the researchers have opened new possibilities for the design of cathodes, an even bigger feat, apparently.

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