MOUNTAIN SPARK GAPS

NPARC—The Radio Club for the Watchung Mountain area

Website: http://www.nparc.org
Club Calls: N2XJ, W2FMI

VOLUME 46 May 2011 NO. 5

UPCOMING EVENTS

Regular Meetings

Monday June 13 7:30 PM
Salt Brook School
Monday June 27 7:30 PM
Borough Hall Recreation
Meeting Room

Upcoming Events

May 30 NP Parade
June 18 Kids Day
June 25—26 Field Day
See Inside

Meeting Schedule

Regular Meeting: 7:30—10:30 PM
2nd Monday of each month at the
Salt Brook School Cafeteria
Springfield Ave. and Maple St.
New Providence

Informal Project Meeting: 7:30—9:00 PM
4th Monday of each month at the
Salt Brook School Cafeteria
Springfield Ave. and Maple St.
New Providence

Everyone is Welcome
If a normal meeting night is a holiday, we usually meet the following night.
Call the contacts below.

Club Officers for 2011

President: N2KDK, Paul Campano
908-508-9595
Vice Pres.: K2MUN. David Berkley
908-500-9740
Secretary: K2JV Barry Cohen
908-464-1730
Treasure: K2YG Dave Barr
908-277-4283
Activities: KC2OSR, Sam Sealy
973-635-8966

On the Air Activities

Club Operating Frequency
145.750 MHz FM Simplex

Sunday Night Phone Net
Murray Hill Repeater (W2LI) at 9:00 PM
Transmit on 147.855 MHz
With PL tone of 141.3 Hz
Receive on 147.255 MHz
Net Control K2AL

Club Internet Address

Website:http://www.nparc.org
Webmaster K2MUN David Berkley
Reflector: nparc@mailman.qth.net
Contact K2UI, Jim

MOUNTAIN SPARK GAPS

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The Watchung Mountain Area Radio Club
P.O. Box 813
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Contributing Editors:
WB2QOQ Rick Anderson
WB2EDO Jim Brown

Climatological Data for New Providence for April 2011

The following information is provided by Rick, WB2QOQ, who has been recording daily weather events at his station for the past 29 years.

TEMPERATURE -
Maximum temperature this April, 84 deg. F (April 26)
Last April(2010) maximum was 90 deg. F.
Average Maximum temperature this April, 63.3 deg. F
Minimum temperature for this April, 32 deg. F (April 2,6,22)
Last April(2010) minimum was 37 deg. F.
Average Minimum temperature this April, 41.2 deg. F
Minimum diurnal temperature range, 8 deg. (50 - 42 deg.) 4/13; (52 - 44) 4/19.
Maximum diurnal temperature range, 34 deg. (83 - 49 deg.) 4/11.

Average temperature this April, 52.3 deg. F
Average temperature last April, 57.0 deg. F

PRECIPITATION -
Total precipitation this April - 6.57" rain.
Total precipitation last April - 3.23" rain.

Maximum one day precip. event this April; April 16; 2.3" rain.
A trace of wet snow on April 1.
Measurable rain fell on 18 days this April, 9 days last April.
==========
Rick Anderson
5/24/11

243 Mountain Ave.
New Providence, NJ
(908)464-8911
rick243@comcast.net

Lat = 40 degrees, 41.7 minutes North
Long = 74 degrees, 23.4 minutes West
Elevation: 380 ft.
CoCoRaHS Network Station #NJ-UN-10

MISCELLANEA

PRESIDENT'S COLUMN

Not available at press time.
(Hint, Hint)

NPARC members are invited to participate in this years Memorial Day Parade, taking place on Monday, May 30. Yea, I know; it may seem a bit premature to talking about the parade, but it will be here before we know it. Our club has annually participated in this town event, for as long as I can recall; and a decent attendance in this club activity is requested. This is the one public event where hundreds of town's people get to see the club members, and a good attendance is most welcomed. Last year we had 10 members participate in our parade unit, which was a fairly decent number, but it would be great to have a better showing. Our unit will walk the parade route, down Springfield Ave., between Central Ave. and Academy St. Please consider taking part in this community event. Please contact Rick, WB2QOQ, if you are interested in participating in the parade or have questions. rick243@comcast.net; (908) 464-8911.

2010 Marchers

In addition, the NPARC Emergency Response Team will provide communications assistance to the parade organizers and borough officials.

MORE MISCELLANEA

A PLEA FOR HELP

Spark Gaps needs content!
Anyone who has information of interest to club members is requested to write it up and send it along. At present there are only three of us providing input. Certainly there are others in the club who can help out. Thanks in advance.

OTHER EVENTS

New Providence Memorial Day Parade

WB2QOQ needs additional marchers. The march is only about one mile and Rick can not carry the club banner alone.

Kids Day

June 18 At the Gazebo on Springfield Avenue in New Providence. Times to be announced. A VHF station and a HF station are planned.

Field Day

June 25 & 26. Present plans are for a class 1F station at the Red Cross Charter House in Summit and a class 2A station at Governor Livingston High School in Berkeley Heights. These are the same locations used in prior years. The makeup of the class A station may change based on available equipment and personnel.

SCIENTIFIC TIDBITS

FAST FOOD ADDICTION

Now here is something for all you Junk-Food junkies. This is a little secret that the fast-food industry doesn't want the general public to know.

Junk Food is literally addictive, producing changes in brain chemistry similar to those cocaine causes. To explore how overeating affects the brain, scientists at the Scripps Research Institute in Florida monitored electrical activity in the brains of rats given unfettered access to cheesecake, frosting, bacon, and other fatty, high-calorie foods. Not surprisingly, the rats quickly became obese. They ate compulsively and continuously, even ignoring electric shocks applied to their feet in the presence of food. (The shocks deterred two control groups, not on this high junk-food diet, from eating.) As the food-addicted rats ate, the high-fat, high-sugar, high-salt foods lit up the pleasure centers of their brains just as if they were taking drugs; over time, the rats had to eat more and more fat, sugar, and salt to feel rewarded. They lose control, which is the hallmark of addiction. When the junk-food was removed and health-food was offered, the rats were so upset that they basically starved themselves for two weeks. The finding doesn't surprise food experts like Dr. Gene-Jack Wang of Brookhaven National Laboratory, who points out that fast-food meals and heavily processed foods are stripped of fiber and nutrition and designed to trigger innate preferences for fat, sugar and salt. "We make our food very similar to cocaine now," he says.

This finding seems the beginning of a rational explanation to the obesity epidemic that is rampant with our youngsters. No exercise and highly processed foods makes for a deadly combination!

FLEXIBLE TOUCH SCREENS DEVELOPED

Stanford scientists have developed a plastic touch-screen coated with silver and gold nanowires designed to be lighter, more durable and less expensive than today's glass touch-screens. The plastic touch-screens could also be produced faster and are ready for use in consumer electronics "immediately". The same technology could be used in solar panels as well. The scientists predict that machines printing newspapers could instead churn out rolls of touch-screens and electrodes for solar panels. Since newspapers are fast becoming an obsolete medium for disseminating information, their presses might as well find some other useful work to do.

Jim
WB2EDO

Stanford Report, May 16, 2011

Light and Magic: Stanford engineers create a tiny, energy-efficient laser for optical communication systems

In the push toward ever-smaller and ever-faster data transmission technology, a team of Stanford electrical engineers has produced a nanoscale laser that is much faster and vastly more energy efficient than anything available today.

BY ANDREW MYERS

To the Silicon Valley mantra of "faster, smaller" semiconductors, you can now add "more efficient." The electrical data interconnections inside the computers of America's massive datacenters consume huge amounts of electricity, and there is a technological drive afoot to reduce that consumption.

To that end, Stanford researchers have unveiled a tiny, highly efficient semiconductor laser that could herald a new era in low-energy data interconnects that communicate with light as well as electrons.

"Today's electrical data transmission circuits require a lot of energy to transmit a bit of information and are, relatively speaking, slow," said Jelena Vuckovic, an associate professor of electrical engineering at Stanford working on the new generation of nanoscale lasers.

She and her team – including Stanford graduate students Bryan Ellis and Gary Shambat, in collaboration with the research groups of James Harris at Stanford and Eugene Haller at the University of California-Berkeley – introduced their laser in a paper just published in *Nature Photonics*.

Crossing the threshold

Vuckovic is working on a type of data transmitter known as a photonic-crystal laser. These lasers are particularly promising, not just for their speed and size, but because they operate at low thresholds – they don't use much energy.

"We've produced a nanoscale optical data transmitter – a laser – that uses 1,000 times less energy and is 10 times faster than the very best laser technologies in commercial use today," said the professor. "Better yet, we believe we can improve upon those numbers."

While others have created low-threshold lasers, Vuckovic said, the most promising have required a second laser to inject them with the energy they need to work – known as "pumping" – hardly an ideal solution.

"We really needed a laser pumped with electricity, not light," she said. The only available electrically pumped photonic-crystal laser was inefficient and difficult to fabricate, making it commercially impractical. Now, for the first time, Vuckovic has demonstrated an electrically pumped laser that is both easy to manufacture and delivers dramatically reduced energy consumption.

To create the laser, the researchers first "grow" a wafer of gallium arsenide, a semiconductor crystal, using a beam that sprays molecules to build layers one by one. At certain points in the layering process, they shuffle in three thin layers of a second crystal – indium arsenide. A cross-section reveals that the indium arsenide appears like little bumps or hills – quantum dots – within the wafer.

A deck of cards

When done, the wafer resembles a sort of nanophotonic deck of cards a mere 220 nanometers thick. Thick, however, is a relative term. It would take more than 1,000 of Vuckovic's wafers stacked atop one another to equal the thickness of a single playing card.

Next, the engineers "dope" two discrete areas on top of the wafer with ions. On one side, the researchers seed ions of silicon, and on the other they implant ions of beryllium.

These two regions are faintly visible on the surface, widening toward each other, approaching but never quite meeting at the center of the wafer. These ion-infused regions help focus the current flow to a very precise area at the core of the wafer where light is emitted, improving the performance of the laser.

Finally, with the basic wafer fabricated, the researchers have yet one more trick up their engineering sleeves. They finish by etching a precise honeycomb pattern of circular holes through the wafer.

The size and positioning of these holes is critical to the success of the laser. If the holes are too small or too large, spaced too closely or too far apart, the laser will not perform optimally – in some cases, it won't perform at all.

"These holes are almost perfectly round with smooth interior walls and are very important to the laser's function. They act like a hall of mirrors to reflect photons back toward the center of the laser," said Vuckovic.

Here, in the heart of the wafer, the photons are concentrated and amplified into a tiny ball of light – a laser – which can be modulated up to 100 billion times per second, 10 times the best data transmitters now in use. Thus the light becomes binary data – light on, 1; light off, 0.

Real-world possibilities

At one end of a semiconductor circuit is a laser transmitter beaming out 1s and 0s as blasts of light. At the other end is a receiver that turns those blasts of light back into electrical impulses. All that is needed is a way to connect the two.

To do this, the researchers heat and stretch a thin fiberoptic filament, hundreds of times thinner than a human hair. The light from the laser travels along the fiber to the next junction in the circuit.

All this happens in a layer so thin hundreds of these nanophotonic transmitters could be arranged on a single layer, and many layers could then be stacked into a single chip.

Before Vuckovic's laser interconnect becomes commonplace, however, certain questions will need to be resolved. The new laser operates at relatively cold temperatures, 150 degrees Kelvin and below – about 190 degrees below zero Fahrenheit – but Vuckovic is confident and pressing forward.

"With improvements in processing," she said, "we can produce a laser that operates at room temperature while maintaining energy efficiency at about 1,000 times less than today's commercial technologies. We can see a light on the horizon."

Vuckovic's engineering research was made possible by funding from Stanford Graduate Fellowships, the Interconnect Focus Center and the Air Force Office of Scientific Research.

Andrew Myers is associate director

Thanks to Ralph NM5RM for supplying this article