MOUNTAIN SPARK GAPS

NPARC—The Radio Club for the Watchung Mountain Area

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

VOLUME 50 NO.7 July 2015

UPCOMING EVENTS

Regular Meetings

8/10 & 8/24
Monday 7:30
NP Community Center

Meeting Schedule

Regular Meeting: 7:30—9:00 PM
2nd Monday of each month at the
NP Senior & Adult Center
15 East Forth Street
New Providence

Informal Project Meeting: 7:30—9:00 PM
4th Monday of each month
Same location
Everyone is Welcome
If a normal meeting night is a holiday, we usually meet the following night.
Call one of the contacts below
or check the web site

Club Officers for 2015

President: KC2WUF David Bean
973-747-6116
Vice President:K2UI Jim Stekas
973-377-4180
Secretary: KD2EKN Tim Farrell
908-244-6202
Treasurer: K2YG Dave Barr
908-277-4283
Activities: W2PTP Paul Wolfmeyer
201-404-6914

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

Digital Net
First & Third Mondays 9 PM
Details as announced.

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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Contributing Editors:
WB2QOQ Rick Anderson
WB2EDO Jim Brown

Climatological Data for New Providence for June 2015

The following information is provided by Rick, WB2QOQ, who has been recording daily weather events at his station for the past 34 years.

TEMPERATURE -
Maximum temperature this June, 91 deg. F (June 22)
Last June(2014) maximum was 91 deg. F.
Average Maximum temperature this June, 79.1 deg. F
Minimum temperature for this June, 48 deg. F (June 2,7)
Last June(2014) minimum was 48 deg. F.
Average Minimum temperature this June, 60.8 deg. F
Minimum diurnal temperature range, 7 deg.(55-48 deg.) 6/2;(70-63)6/18;(71-64)6/20
Maximum diurnal temperature range, 30 deg. (78-48 deg.) 6/7

Average temperature this June, 70.0 deg. F
Average temperature last June, 71.4 deg. F

PRECIPITATION -
Total precipitation this June - 5.95" rain
Total precipitation last June - 4.69"

Maximum one day precip. event this June; June 15, 1.24" rain.
Measurable rain fell on 15 days this June, 11 days last June.

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Rick Anderson
7/10/15
243 Mountain Ave.
New Providence, NJ
(908)464-8912
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

Elevation: 380 ft.
243 Mountain Ave.
New Providence, NJ
(908)464-8912
rick243@comcast.net
Lat = 40 degrees, 41.7 minutes North
Long = 74 degrees, 23.4 minutes West

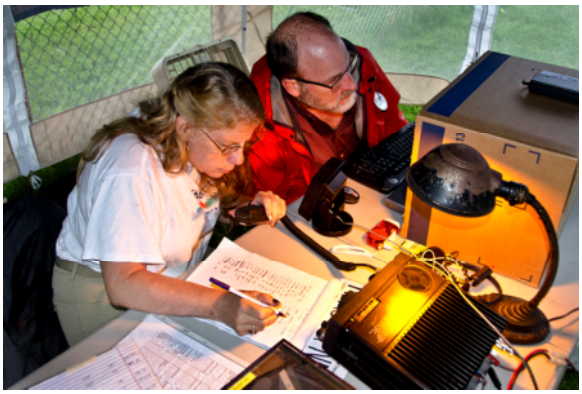
As promised here are a bunch of Field Day 2015 photos. Thanks to AL K2AL and Jon AE2JP.

The Berkeley Heights Fire Department paid us a visit on Saturday evening. It gives a good idea of conditions.

Where is the safety man?

Just the beginning of the tarps.

Cooking in the rain!



The HF tent before the rain got heavy.

The VHF tent. Warm & dry?

VHF tent buttoned up.

K2AL making the Solar bonus point QSO's

Wind gusts got the better of the food tent.

A Factor of Two

Jim Stekas - K2UI

This year is the 100th anniversary of Einstein's General Theory of Relativity (GR), a theory of gravity which was to supersede Newton's theory and given us black holes, dark energy, gravitational time dilation, and enough fascinating stuff to fill several cable science channels. At the time, there were no significant conflicts between experiment and Newton's theory, so Einstein's only motives for "inventing" GR were purely theoretical.

First, the equivalence between inertial and gravitational mass should be a consequence of the theory and not an "accident". (the *Equivalence Principle*)
Second, a correct theory of gravity should treat mass and energy on an equal footing as required by Special Relativity.
Third, Newton's gravitational forces propagated instantaneously, violating the "prime directive" of Special Relativity that nothing can travel faster than light.

In Galileo's famous experiment at the Tower of Pisa he found that all objects regardless of weight and composition fell at the exactly the same rate, a verification of the equivalence principle. A consequence of this is that in problems of gravitational attraction of small bodies (e.g. falling rocks and satellites) by celestial objects (e.g. Earth) the mass of the small body can be factored out of the equations completely.

Requiring gravity to respect the relation E=mc^2 means that gravity should act on anything with energy, including light. Gravitational deflection of light was not a new idea. Well before quantum mechanics, light was viewed to be "corpuscular" in nature – minute particles of infinitesimal mass. In the late 18th century John Mitchell used high school Newtonian physics to calculate how light "corpuscles" would behave when radiating from a star. He found that a star of the same density as the Sun, but 500 times larger, would have an escape velocity equal to the speed of light. Laplace did a similar calculation and speculated on the existence of small and dense "dark stars" (black holes) from which light could not escape. As it turns out, naive application of Newton's equations to light is not valid but gives the correct expression for the Schwarzchild radius.

In 1911, Einstein used the same basic approach to estimate the gravitational deflection of light by the sun. GR was still a work in progress, so Einstein did his best to apply Special Relativity to Newton's theory in the hope that the result be a reasonable approximation of a complete theory of GR might produce. He calculated that a ray just grazing the sun would be deflected by an angle of 0.87 arc second. William Campbell assembled a Lick Observatory team to observe the August 21, 1914 solar eclipse in the Crimea and capture images of stars close to the edge of the sun during totality and make a definitive measurement. Unfortunately for the Lick team, World War I broke out while they were setting up their experiment and their equipment was confiscated and they were sent home.

This unfortunate turn of events for the Lick team proved to be a lucky break for Einstein. The delay allowed Einstein time to calculate the deflection angle using the full-up theory of GR. GR predicted a deflection angle of 1.75 arc seconds, twice as large as Einstein's previous calculation.

In 1919, teams led by Arthur Eddington and Andrew Cromlin observed the March 8 eclipse in Borneo and Brazil. Their observations yielded 8 good images which showed deflections that confirmed the GR prediction. The results made the front page of the New York Times and made Einstein a worldwide celebrity.

SCIENTIFIC TIDBITS

Ion Engine for Mini Satellites

Most of the attention is garnered by big, sexy space projects like Mars exploration, but there are also a couple dozen little satellites known as "CubeSats" circling around our planet. Conceived a little over a decade ago at Stanford University and Cal Poly, this breed of nanosatellite typically weighs no more than 1.33 kg and has a volume of 1 L. Most carry only one or two scientific instruments and are deployed for various purposes by universities. An advantage is that because of their small and uniform size, they can be launched for less than $100,000 apiece. A disadvantage is that you cannot fit a conventional propulsion system into one of them, so they just follow their fixed trajectory until they fall into the atmosphere and burn up.

However, a new type of propulsion system developed at the MIT Space Systems Lab is likely to change all that. It is based on a small ion thruster device recently introduced by Professor Paula Lozano and his associates. The units measure only a square centimeter and 2 mm thick, so it would be possible to attach several of them to one CubeSat, thus providing controllable propulsion. Each thruster is covered with 500 microscopic tips that emit an ion beam when you apply a voltage, creating a puff of charged particles that shoves the satellite in the opposite direction. Each array produces only about 50 N of force, which would not do much on Earth (about enough to move two mosquitoes). In space, however, it is sufficient to nudge a 2 pound satellite. According to Lozano, such a satellite outfitted with several microthrusters could "….not only move to change its orbit, but do other interesting things like turn and roll." Lozano believes that microthrusters may even be used to power much larger satellites someday; flat panels lined with multiple thrusters could propel a satellite through space, switching directions by acting like a rudder.

Vibrations Can Unlock Doors

Futuristic ways to open doors include retinal and fingerprint scans. But AT&T Labs researchers have created a way to open doors with vibrations passing through the body. The vibrations come from piezoelectric transducers, which can be put in watches or smartphones. A user's bone length and density create a unique vibration, which is picked up be a receiver on the door. The door stays locked until the right person tries to enter. If this system can be programed to admit more than one person, this development opens up all sorts of intriguing security possibilities. Can you imagine using this method to secure you automobile?

Jim WB2EDO