The Observer

February 2014 (#35)

Schedule of public programs on last page!

COMET ISON CROAKED

As the last two issues of this newsletter (August 2013 and December 2013) discussed Comet ISON, the pages of this newsletter also must dutifully report that Comet ISON was a complete bust, as it largely disintegrated upon passing close to the Sun on November 28. On December 2, the NASA Comet ISON Observing Campaign (CIOC) reported this humorous piece for Comet ISON:

> ***IN MEMORIAM***
> *By Karl Battams,12/02/2013 - 08:32*
>
> *Comet C/2012 S1 (ISON)*
> *Born 4.5 Billion BC, Fragmented Nov 28, 2013 (age 4.5-billion yrs old)*
>
> *Born in a dusty and turbulent environment, comet ISON spent its early years being jostled and struck by siblings both large and small. Surviving a particularly violent first few million years, ISON retreated to the Oort Cloud, where it maintained a largely reclusive existence for nearly four billion years. But around 3-million B.C., a chance encounter with a passing*

star coerced ISON into undertaking a pioneering career as a Sungrazer. On September 21, 2012, ISON made itself known to us, and allowed us to catalog the most extraordinary part of its spectacular vocational calling.

Never one to follow convention, ISON lived a dynamic and unpredictable life, alternating between periods of quiet reflection and violent outburst. However, its toughened exterior belied a complex and delicate inner working that only now we are just beginning to understand. In late 2013, Comet ISON demonstrated not only its true beauty but a surprising turn of speed as it reached its career defining moment in the inner solar system. Tragically, on November 28, 2013, ISON's tenacious ambition outweighed its ability, and our shining green candle in the solar wind began to burn out.

Survived by approximately several trillion siblings, Comet ISON leaves behind an unprecedented legacy for astronomers, and the eternal gratitude of an enthralled global audience. In ISON's memory, donations are encouraged to your local astronomy club, observatory or charity that supports STEM and science outreach programs for children.

RADIO TELESCOPE AT SOUTH HARRISON OBSERVATORY

Otter Creek–South Harrison Observatory staffer Henry Sipes has constructed a new instrument for the South Harrison Observatory: A small radio telescope. He constructed a “Ku-band radio telescope” using common satellite TV components; a DISH TurboHD antenna with LNB-Low Noise Blocker, a Channel Master satellite signal meter, and a LabJack U3-LV analog to digital converter with USB link to a personal computer link. With these Henry has been able to detect radio signals from the Sun and Moon.

In our daily lives, we spend the majority of our time living, working, and seeing in the visual world, taking in only a fraction of the electromagnetic spectrum (See Figure 1). We use other parts of the spectrum, microwaving our food, listening to the radio, going to the doctor to get x-rays, but because our eyes are tuned to visual frequencies most of us spend little time thinking about the electromagnetic spectrum that is all around us. The radio telescope concentrates on that fraction of the spectrum which has the lowest energy of them all, the radio spectrum, and specifically the Ku band of microwave frequencies (12-18 GHz). Television satellite providers, for

which the dish in this telescope was designed, use the downlink range of 12.2 to 12.7 GHz.

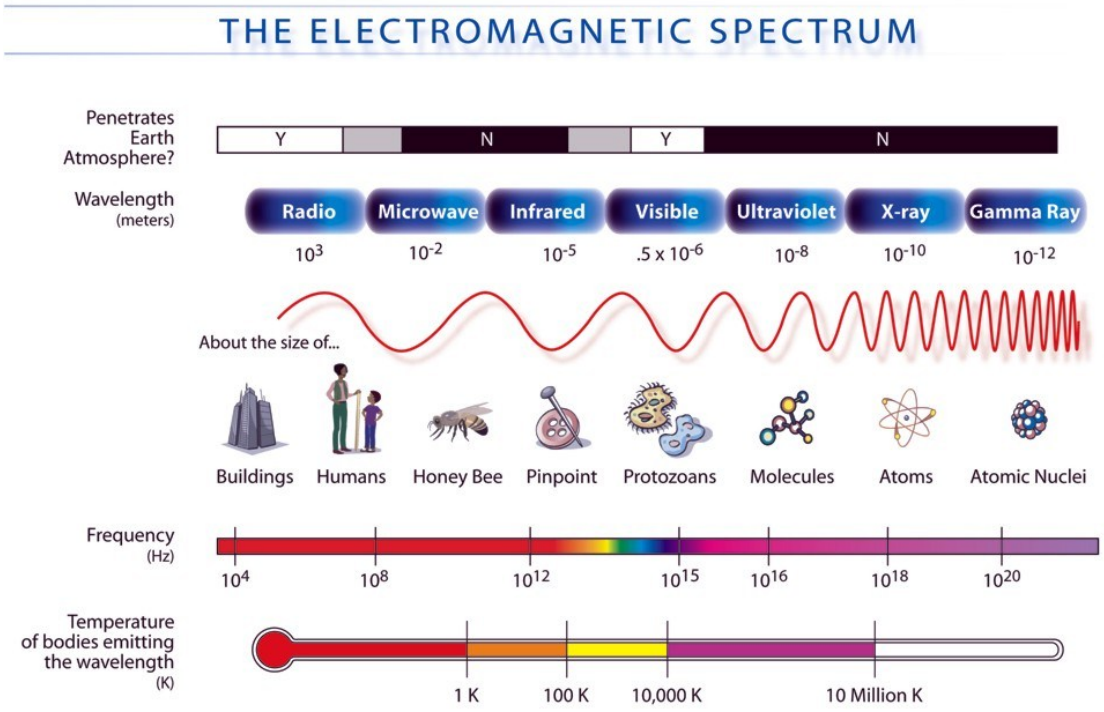


Figure 1: Electromagnetic Spectrum, Credit: Mynasaweb

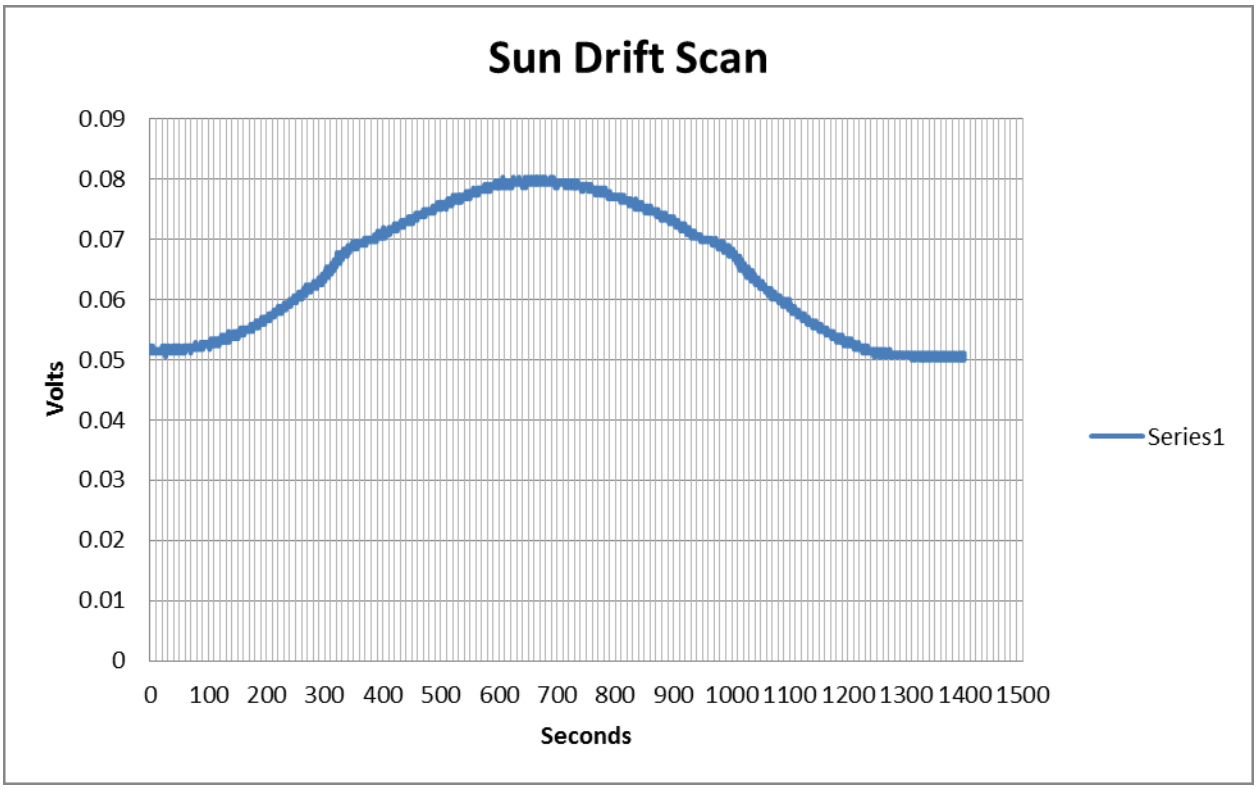
Every object in the universe that is warmer than what scientists call absolute zero emits energy in the radio spectrum. Humans, plants, the ground, a building, etc. all emit radio waves. As something gets warm the molecules and the very basic atoms that make up the molecules begin to move and collide with one another. As they accelerate they emit energy as radio photons. It is these very radio photons that the radio telescope collectively measures as radio waves from astronomical sources.

There are two very obvious thermal emitters in our daily sky, the Sun and the Moon. The Sun is the strongest emitter of radio waves nearest to the Earth, so it makes a great target to those new to radio astronomy. As an emitter of thermal radiation, it produces radio waves with microwave frequencies as a result of its average 10,000°F surface temperature. Solar flares and sunspot activity can also create surges of radio emissions. The Moon reflects the Sun's light and this light from the Sun heats the surface of the Moon. As a thermal emission this heat can be observed in the radio spectrum and if properly measured a radio graph of the Moon's phases can be produced.

Another radio source which at first does not seem obvious is the sky itself. No matter what point in the sky the radio telescope is aimed at, it will measure background radio noise. Besides the sky radio background, there are also satellites producing microwave radio frequencies.

The radio telescope, made using a DISH satellite TV receiver.

The output of the radio telescope can be measured to reveal information about an object. For example, below is the output from the telescope as the Sun passed in front of it.



At the observatory, Henry can use the radio telescope to demonstrate how astronomers detect and measure radio sources in the sky – day or night!

OBSERVATORY STAFFER PUBLISHED IN *SCIENTIFIC AMERICAN*

In the January 2014 issue of *Scientific American* magazine is an article with the title "The Case Against Copernicus". It is by Canadian author Dennis Danielson and Otter Creek–South Harrison Observatory staffer Chris Graney. The article focuses on how astronomers in the 17th century had what appeared at the time to be some very solid reasons for doubting the Copernican theory which said that the Earth revolves around the Sun (instead of the Sun revolving around the Earth). It turns out that, at that time, astronomers did not understand certain aspects of how a telescope works when it is used to view the stars, and this fooled them into believing that the Copernican theory required stars to be impossibly large.

OBSERVATORY VISITORS PUT THEIR CAMERAS TO USE

Did you know that many visitors to South Harrison Observatory don't just look through the telescopes, but they take pictures through them? It is true – lots of people get pretty good pictures of the Moon (or Sun, if they come for a daytime program) using nothing more than their cell phone cameras. Rob and Nate Arnold took the Moon photos seen here when visiting the observatory this past November. The camera they used was an older Casio Exilim EX-FC100, which Nate described as "a cheap, older model that is now unavailable". They just put the camera up to the eyepiece and snapped some photos.

These photos also give you some idea of what the Moon looks like through a telescope at South Harrison – although of course the real thing looks even better. But not every photo comes out looking as good as the ones above. People who try to take photos should keep in mind that sometimes the results are a bit blurry, like the one at right.

Jefferson Community & Technical College
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2014 Schedule

South Harrison Park Observatory Events

DAYTIME PROGRAMS	
Jan 25	11:00am to 1:00 pm
Feb 22	11:00am to 1:00 pm
Mar 22	11:00am to 1:00 pm
April 19	11:00am to 1:00 pm
May 17	11:00am to 1:00 pm
June 21	11:00am to 1:00 pm
Aug 16	11:00am to 1:00 pm
Sept 20	11:00am to 1:00 pm
Oct 18	11:00am to 1:00 pm
Nov 15	11:00am to 1:00 pm

NIGHTTIME PROGRAMS:	
Feb 8	6:30 pm to 8:30 pm
Mar 8	7:00 pm to 9:00 pm
April 5	8:00 pm to 10:00 pm
May 3	9:00 pm to 11:00 pm
May 31	9:30 pm to 11:30 pm
June 28	9:30 pm to 11:30 pm
July 19	9:30 pm to 11:30 pm
Aug 2	9:30 pm to 11:30 pm
Sept 6	8:30 pm to 10:30 pm
Oct 4	7:30 pm to 9:30 pm
Nov 1	7:00 pm to 9:00 pm
Nov 22	6:30 pm to 8:30 pm

All programs at South Harrison Park are open if the state highways are drivable.
Daytime programs allow you to safely view the Sun using solar filters.
Nighttime programs allow you to view the Moon, Stars, Planets, and more.

The facility is handicapped accessible and we feature a video display system for cloudy days and/or nights.

Contacts: Park Astronomer – Henry Sipes Home 270-828-6191
Cell 270-668-2103
Harrison County Park Office – 812-738-8236

Websites: http://www.harrisoncoparks.com/Observatory.html
http://www.jefferson.kctcs.edu/observatory/
http://astronomy2009.us/