

The Sunset *Gazette*

Serving the Tri-Cities since 1975

Volume 11, Issue 9

April 2014



Meeting information

Meetings are now at the Auburn City Hall, 113 East Elm Street in Auburn. The meetings will usually be on the 2nd Friday of each month at 7:00 PM. Watch the newsletter for changes in dates and times. Membership is not required to participate in meetings and activities. See last Page for this month's meeting site.

Membership Information

Our club has switched to e-mailing our newsletters. For those wishing to receive a hard copy mailed an additional dues of \$10.00 per year is required.

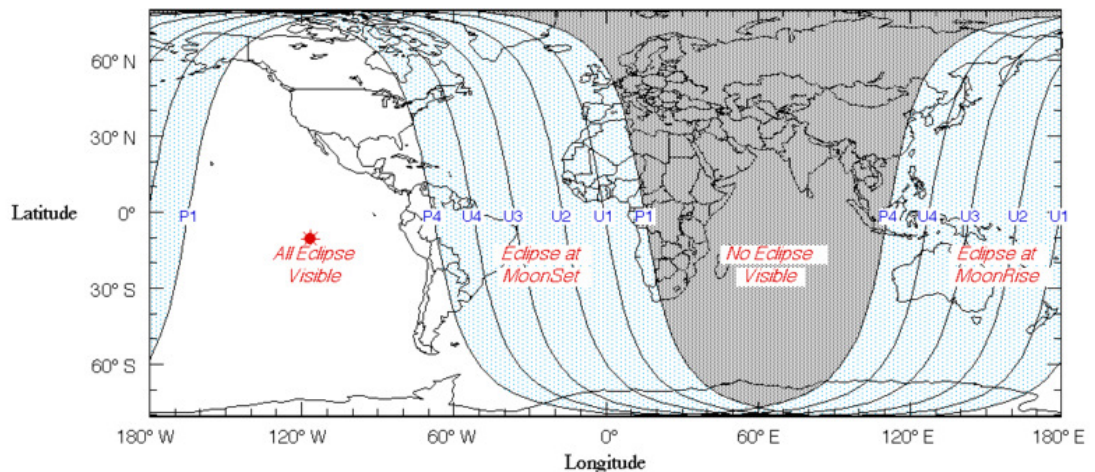
New Membership Rates:

\$5 per Year

Treasurer's address for renewals and subscriptions:

Tom Smith, 3423 Hidden Road,
Bay City, MI 48706-1243

Total Eclipse of the Moon, Morning of April, 15th!



Total Lunar Eclipse North American times (Daylight savings time)

Event	EDT (Eastern Daylight Time) Morning April 15
Penumbra first visible?	1:20 am
Partial eclipse begins	1:58 am
Total eclipse begins	3:07 am
Mid-eclipse	3:46am
Total eclipse ends	4:25 am
Partial eclipse ends	5:33 am

For us in Michigan the eclipse will start on 15th April in the very early morning at 1:58 am. The Penumbra phase will be very difficult to spot.

Let's all hope for clear skies!!!

Cosmic Rays

In this issue (and the next) we will continue the series with another example of a high energetic gamma-ray source before we look at the future of gamma-ray telescopes as well as some known and not so well known facts how cosmic rays affect Earth's atmosphere, its contribution to ambient radiation, its effect on electronic equipment (important in a world evermore dominated by electronic devices and gadgets), and of course space travel.

Active galaxies are one of the most energetic phenomena known in the universe and one subgroup are the so called **blazars** in which one of the active gets generated by the black hole in the galaxies' center lies in the direction of Earth. One of the brightest active object of this class is PKS 2155-304 with a red shift of 0.116 and distance of 1.5 billion light years in the constellation Pisces Australis. Usually the gamma radiation emission is fairly weak but from time to time like in 2006 its gigantic eruptions make this blazar the brightest source of high energetic gamma radiation in the sky. In late summer 2008 the Cherenkov telescope array H.E.S.S. in Namibia, an optical telescope near H.E.S.S., the satellite Fermi and two other X-ray satellites were studying the object in the widest possible range of the electromagnetic spectrum with some surprising results: Whereas during the active phase the gamma *and* X-ray radiation in- and decrease simultaneously it did not in its quiet phase. Instead the emission in the visible spectrum followed that of the high energetic gamma emission - a very strange and mysterious behavior and so far no explanation was found. Apparently the various parts the blazar responsible for the emission are coupled together in a much more complex way than previously thought.

Earthbound gamma observatories are currently operable for sources with emissions between 10^{11} to some 10^{13} eV (for comparison the Large Hadron Collider in Cern will manage 14×10^{12} eV at the utmost when it comes back in operation in 2015). At lower energies the light signals (caused by the Cherenkov light emitted by showers of fast charged particles generated when a gamma ray hits the molecules of our atmosphere at near light-speed) are too weak to be detected with the current size of mirrors (e.g. MAGIC telescopes, 2580 foot^2 , 240 m^2). Above 10^{13} eV the number of events drops significantly and too few events occur to generate a significant data stream to work with. A major step to energies down to 3×10^9 eV and therefore closing the gap to the gamma ray satellites is the recently finished largest Cherenkov telescope **H.E.S.S. II** (see right picture, source Wikipedia). It is situated in the same array formed by the four smaller 12 m H.E.S.S. telescopes. The four telescopes from the first phase form the endpoints of a square with 120m side lengths with a mirror size of 108 m^2 or 11.73 m in diameter (382 circular mirror facets with 0.6m diameter).



The fifth telescope H.E.S.S II is situated in the diagonal cross hair of the square and has a mirror made up of 875 hexagonal mirror facets with 0.9m diameter. Together this amounts to 614 m² or a mirror of 28 m diameter! The overall height of the structure is 40 m and the overall weight 600 tons. It is currently by far the largest reflective telescope in the world.

Another still unrealized project tries to increase the sensitivity by a factor 10. The project is the **Cherenkov Telescope Array (CTA)** and currently there are two observatories planned: one in the southern hemisphere which will have telescope types of 6, 12 and 24 m diameter. The 50 to 100 telescopes would cover an effective detection area of 7 square kilometers and be able to have a detection range of tens of 10⁹ eV to above 10¹⁴ eV. The second array would be built in the northern hemisphere consisting of two larger types and focus on the study of extragalactic objects at the lowest possible energies. The physics program of CTA goes beyond high energy astrophysics into cosmology and fundamental physics and would be a similar quantum step from the existing telescopes like the Atacama Large Millimeter Array (ALMA).

Right: Prototype of 12 meter CTA telescope under construction; Berlin, Germany, April 2013. Source Wikipedia



The CTA is on the road map of the European Strategy Forum on Research Infrastructures (ESFRI), the European Astroparticle Physics network ASPERA and the European Astrophysics network ASTRONET and will be designed through international collaboration with strong European involvement. Production of first telescope prototypes will start in 2013.

Top: Artistic drawing of the CTA site, G Perez, IAC. Source Wikipedia.

Next SAS: How cosmic rays affect Earth's atmosphere, its contribution to ambient radiation, its effect on electronic equipment and space travel.

SUNSET ASTRONOMICAL SOCIETY
THE SUNSET GAZETTE
SERVING THE TRI- CITIES SINCE 1975



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Treasurer - Thomas Smith	tom258@att.net
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This issue can be accessed in color on the website of the SAS!!!

<http://www.sunsetastronomicalsociety.com>

SAS Meeting

Start: 7:00 PM

Friday April 11th, 2014

Auburn City Hall

113 East Elm Street Auburn

**Welcome members and
guests**

New and old business

Club Business

Treasure report

Refreshments Break

Presentation:

TBD

What's up in the Sky

April 3 Evening: Watch the waxing crescent Moon pass through the Hyades star cluster thereby eclipsing several stars. Binocular or telescope needed!

April 6 Evening: Observe the near first quarter Moon shine near Jupiter.

April 7: First Quarter Moon

April 9 All Night: Mars is at opposition.

April 10 Evening: Watch out for the Moon below Regulus.

April 12 Dawn: Catch Neptune when its just 0.7deg south of much brighter Venus. Telescope needed!

April 14-15 All Night: Mars is at its closest to Earth!

The full Moon shines very near Spica and Mars and a **total Lunar eclipse is visible from Michigan!**

April 15: Full Moon and Lunar eclipse!

April 17 Dawn: Saturn shines very near the Moon.

April 22 Pre Dawn: The weak Lyrid shower peaks in the morning of April 22nd.

April 25,26 Dawn: On the 25th the Moon shines to the upper right of Venus and on the 26th it shines to the lower left of Venus.

April 23 Evening: Double shadow event on Jupiter: The shadows of Io and Ganymede fall on Jupiter simultaneously from 10:08 to 10:32 pm EDT.

April 22: Last Quarter Moon

April 29: New Moon

UPCOMING EVENTS

See **Total Eclipse of the Moon in morning of April, 15th!**