



Summer Schedule

The Milwaukee Astronomical Society does not have Membership Meetings during the summer months (June, July, and August), however there is a Board Meeting on second Monday of each month starting at 7PM at the Observatory. The next one is scheduled for August 18th. The Board Meetings are open to the membership and everybody is welcome who is interested in organizational and Observatory related issues.

As always, the Observatory is open on Saturday nights, and also when posted on the Google Group.

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MAS Picnic



Don't forget: Potluck Picnic!

When: **Saturday, August 10th from 4 PM**

Where: MAS Observatory

Who attends: Members & family & friends

What to bring: Dish to share

Things to do: Fellowship, solar observation

See you there!

Public Nights



On July 20th, 1969 the whole nation was watching the breathtaking moments when man set foot on the Moon for the first time. Our Public Night of July 19th was dedicated to the 50th anniversary of Apollo 11 mission. Gene Hanson gave a well prepared talk on the details of that space project, and the Moon landing. In the back of the Quonset Michael Prator set up a table to display models of rockets and spaceships.

After the presentation our guests were able to observe Saturn and Jupiter through various telescopes.

The next Open House will be on Friday, August 23th at 7:30 PM. The theme of the night will be: The Galactic ZOO: Denizens of the Night Sky presented by Randy Culp.

Any help from members willing to man a telescope, give a tour of the Observatory, or direct the traffic in the parking lot is highly appreciated!

Observatory Report

This summer's list of repairs and renovations is well under way now. A new roof has been put on the Ray Zit Observatory along with the roof rafters being raised. New siding that is being put on the building is nearly complete, so the building is looking great.

With the SBIG camera on the G-scope out for maintenance for a couple of weeks, the floor of the Z-dome is being painted, currently the floor has been primed.

The sink faucets in both restrooms are leaking, so new faucets have been purchased and will be installed today.

Use of the Observatory and its equipment continues to be slow due to the lack of clear nights that has carried over from spring and now into summer.

Respectfully Submitted,
Paul Borchardt, Observatory Director

Treasurer's Report

\$7,628.08	Starting Balance as of 06/08/2019
	<u>Expenditures</u>
\$4.34	PayPal fees
\$24.14	Maintenance project
\$810.00	Insurance
\$780.00	Snow & stump removal
\$31.37	Observatory expenses
\$75.46	WE Energies
\$1,725.31	TOTAL Expenditures
	<u>Revenue</u>
-\$5.32	Private donations
\$156.00	Membership dues
\$526.00	Public donations
\$8.82	Grants
\$685.50	TOTAL Revenue
\$6,588.27	Ending Balance as of 07/05/2019

Respectfully Submitted,
Sue Timlin, Treasurer

Meeting Minutes

The meeting was held on July 8th at the MAS Observatory, New Berlin and was called to order at 7:02PM by Tamas Kriska President.

Minutes, Treasurer's, and Observatory Director's Reports electronically submitted ahead of the meeting were approved. Gene Hanson Webmaster gave an update of the process making the website mobile friendly.

Membership Committee Report was electronically submitted ahead of the meeting. Applications of Ketey Wegman & Family, Michael Prator & Family, Akshat Agrawal & Family, and Girish Muralidharan & Family were approved.

Old Business – *The 8" Celestron EdgeHD*: No update since last month. *Maintenance budget*: The maintenance work has started. So far we are within the budget. *Talk request*: Sue still has to contact the Cedarburg and Eagle Public Libraries. *Solar scope*: The shield was purchased and installed. *Solar camera*: Putting virtual Windows 7 on the new laptop was unsuccessful. Possibility of buying a new camera that works under Windows 10 with acceptable frame rate and ability to capture the entire solar disk, and selling the old camera will be investigated.

New Business – *SBIG STT-8300 camera*: The camera will be sent to the manufacturer to repair the filter wheel. *Yard sign*: The damaged east lot sign should be replaced.

Announcement – A 4.5" Meade telescope was donated and will be used as loaner scope. The very last image taken by the old F-scope was printed and given to Gene Hanson. Randy Culp has taken over the map making for the Open Houses.

Respectfully Submitted
Agnes Keszler, Secretary

Membership Report

Since the last Report we received 5 applications. We welcome Ketey Wegman & Family, Girish Muralidharan & Family, Roger Rangarajan & Family, Ken and Korie Christensen & Family, and Dennis Roscoe. The total number of active members is 161.

Respectfully Submitted,
Jeff Kraehnke, Committee Chair

MAS Briefing on Giant Magellan Telescope

Dr. Jim L. Fanson, project manager for the Giant Magellan Telescope (GMT), visited the Observatory on Friday, July 26th and briefed the membership on the status of GMT.

Jim was a MAS member in the late 70s and early 80s. Many longtime members still remembered him, since they were working on the Z-building construction together. The MAS website's history section has many photos from that period.



Jim left Wisconsin to complete his graduate studies at Caltech, then joined NASA's Jet Propulsion Laboratory. He worked on the Hubble Space Telescope, served as lead engineer for the design of the Spitzer Space Telescope, and now he is a Project manager at GMT.

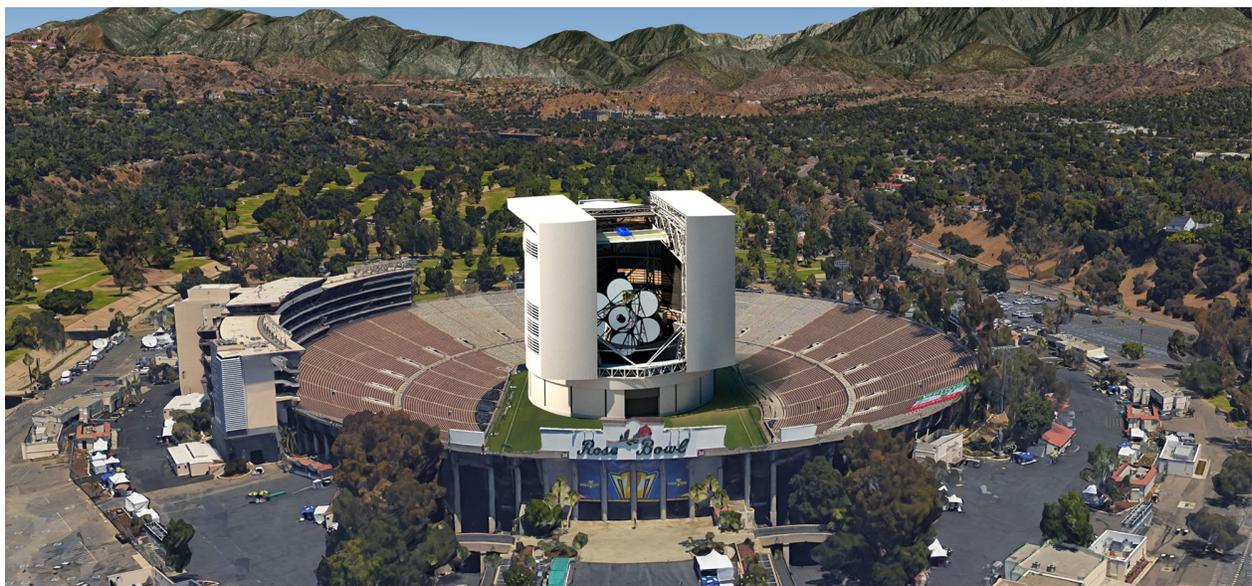
The GMT is a ground-based extremely large telescope under construction, planned for completion in 2028. It will consist of seven 8.4 m (27.6 ft) diameter primary segments, that will observe optical and near infrared (320–25000 nm) light, with the resolv-

ing power of a 24.5 m (80.4 ft) primary mirror and collecting area equivalent to a 22.0 m (72.2 ft) one, which is about 368 square meters. The telescope is expected to have the resolving power 10 times greater than the Hubble Space Telescope, and will be the largest optical observatory in the world, at the time of its first light. The \$1 billion project is US-led in partnership with Australia, Brazil, and South Korea, with Chile as the host country.

From Jim's presentation we learned interesting behind the scene details of the project. It has been recorded and now is available for watching by MAS.



After the talk our guests were given a tour of the Observatory ground. Everybody had a great time, and Jim was happy to see the Observatory and reunite with old friends.



Summer Maintenance Projects

In July the re-building of Ray Zit Observatory has been continued. The siding and I-beam supporting posts were replaced, a new door was installed, the electrical systems were upgraded, and a carpet was laid on the concrete pad.



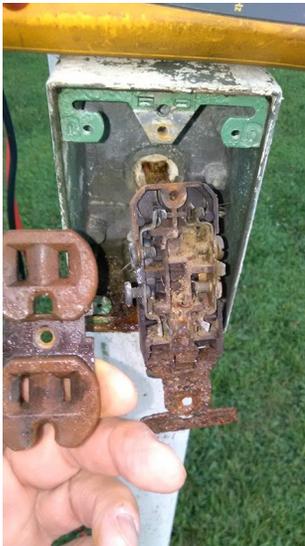
Summer Maintenance Projects

In the Z-building the entrance door was repaired, the threshold replaced, and the dome's floor and stairs were re-painted.



Summer Maintenance Projects

It was noted that the outdoor camera pole power outlet did not have power. After a long search Mike found a blown fuse in the 'B' dome. He replaced the fuse with a screw in circuit breaker. The outdoor camera pole power outlet has been replaced with a 20 Amp GFI outlet and a more robust cover. The electrical code requires GFI (Ground fault interruption) for outdoor outlets. After installing the fuse in the 'B' dome the door would not close because the lower hinge screws had come out of the frame side of the hinge. Mike drilled 1/2 inch holes and used water proof glue to set hardwood dowels (oak) under the hinge. With luck this repair will last as long as the door frame. The power in the North garage is not working. We hope someone will have a memory of that cable run.



Member's Story

Learn How to Use F-scope

I have been imaging for over two years and recently had the opportunity to use MAS's new F-scope – a 100mm f/5.8 refractor on an Astrophysics mount. It is an ideal setup for wide field imaging. My own set up which includes an 80mm refractor, mount, and variety of other equipment takes



about an hour to set up and about half an hour to tear down and pack up. Compared to this, we were up and going through the preliminaries of imaging (centering, focusing, etc.) with F-scope in about 10 minutes. The scope is already polar aligned, and the software can quickly slew to the desired area of the sky with very high accuracy. Closing up the observatory was similarly quick.

My purpose in using F-scope was to get started on narrow band imaging; this is where we use filters to selectively record wavelengths of light that ionized atoms such as hydrogen, oxygen, and sulfur that are common in emission nebulae emit. This gives much superior detail and contrast than what

can be recorded using one shot color cameras (such as a DSLR). It also has the advantage that you can image from light polluted areas and when the moon is up with minimal impact.

The final image that of the Lagoon nebula (shown above in color) that we recorded and processed took about three hours over two nights to record. But it is also worth asking what can be done in less time. Also shown are two single frames with minimal processing – a 5 minute frame taken through a Ha filter (which lets in light at 656 nm, a deep red) and a similar frame taken through



an OIII filter (two lines at 496 and 501 nm, a teal hue). You can already learn a lot about the nebula from this information. The Ha signal is significantly stronger and covers a far greater area – hydrogen is by



far the most common element in the Universe. It is also easier to ionize than oxygen, so the strongest oxygen emissions tend to be close to the hot stars at the center of the nebula that supply the energy to ionize it. The oxygen you see here was formed in the core of large, hot stars and spread into the regions around after their explosive demises, just like every atom of oxygen that exists on Earth and in our Solar System. We owe our lives to these stars that were formed and died billions of years ago. And, finally, in the short Ha frame, you see fine detail in the nebula that you couldn't possibly see through the naked eye even through a very large telescope.

Needless to say, I plan to make more use of F-scope. Even if you are not an imager, I encourage you to come to the Observatory on a clear night and see for yourself the wonders that even short exposure imaging can reveal.

by Arun Hegde

If you would like to learn how to use F-scope, please contact Jeff Kraehnke or Tamas Kriska.

In the Astronomical News

Galaxy Clusters Caught in a First Kiss

For the first time, astronomers have found two giant clusters of galaxies that are just about to collide. This observation can be seen as a missing 'piece of the puzzle' in our understanding of the formation of structure in the universe, since large-scale structures—such as galaxies and clusters of galaxies—are thought to grow by collisions and mergers. The result was published in *Nature Astronomy*.

Clusters of galaxies are the largest known bound objects and consist of hundreds of galaxies that each contain hundreds of billions of stars. Ever since the Big Bang, these objects have been growing by colliding and merging with each other. Due to their large size, with diameters of a few million light years, these collisions can take about a billion years to complete. After the dust has settled, the two colliding clusters will have merged into one bigger cluster.

Because the merging process takes much longer than a human lifetime, we only see snapshots of the various stages of these collisions. The challenge is to find colliding clusters that are just at the stage of first touching each other. In theory, this stage has a relatively short duration and is therefore hard to find. It is like finding a raindrop that just touches the water surface in a photograph of a pond during a rain shower. Obviously, such a picture would show a lot of falling droplets and ripples on the water surface, but only few droplets in the process of merging with the pond. Similarly, astronomers found a lot of single clusters and merged clusters with outgoing ripples indicating a past collision, but until now no two clusters that are just about to touch each other.

An international team of astronomers have now announced the discovery of two clusters on the verge of colliding. This enabled astronomers

to test their computer simulations, which show that in the first moments a shock wave is created in between the clusters and travels out perpendicular to the merging axis. "These clusters show the first clear evidence for this type of merger shock," says first author Liyi Gu from RIKEN national science institute in Japan and SRON Netherlands Institute for Space Research. "The shock created a hot belt region of 100-million-degree gas between the clusters, which is expected to extend up to, or even go beyond the boundary of the giant clusters. Therefore the observed shock has a huge impact on the evolu-



The composite image shows the cluster pair 1E 2216.0-0401 and 1E 2215.7-0404. Scientists determined the pair will collide in 300 to 600 million years. The collision and merger will play out over billions of years. Credit: Liyi Gu, et al./*Nature Astronomy*

tion of galaxy clusters and large scale structures." Astronomers are planning to collect more 'snapshots' to ultimately build up a continuous model describing the evolution of cluster mergers. SRON-researcher Hiroki Akamatsu: "More merger clusters like this one will be found by eROSITA, an X-ray all-sky survey mission that will be launched

this year. Two other upcoming X-ray missions, XRISM and Athena, will help us understand the role of these colossal merger shocks in the structure formation history."

Liyi Gu and his collaborators studied the colliding pair during an observation campaign, carried out with three X-ray satellites: ESA's XMM-Newton satellite, the NASA's Chandra satellite, and JAXA's Suzaku satellite, and two radio telescopes: the Low-Frequency Array, a European project led by the Netherlands, and the Giant Metrewave Radio Telescope operated by National Centre for Radio Astrophysics of India.

phys.org

Adopt a Telescope Program - Signup Sheet

	Adopter	Scope	Location
1	Sue Timlin/John Hammetter	18" F/4.5 Obsession	Wiesen Observatory
2	Steve Volp	12.5" F/7.4 Buckstaff	B Dome
3	Robert Burgess	12.5" F/9 Halbach	A Dome (Armfield)
4	Russ Blankenburg	18" F/4.5 Obsession	Albrecht Observatory
5	Jeff Kraehnke	14" F/7.4 G-scope	Z Dome
6	Lee Keith/Tom Kraus	12" F/10 LX200 EMC	Tangney Observatory
7	Herman Restrepo/Colin Boynton	10" F/6.3 LX200	Ray Zit Observatory
8	Tamas Kriska	Stellarvue SVQ 100 F/5.8	Jim Toeller Observatory
9	Paul Borchardt	Solar scope	SkyShed POD



MAS Observatory

18850 Observatory Rd
New Berlin, WI 53146

www.milwaukeeastro.org

At Your Service

Officers / Staff

President	Tamas Kriska	414-581-3623
Vice President	Lee Keith	414-425-2331
Treasurer	Sue Timlin	414-460-4886
Secretary	Agnes Keszler	414-581-7031
Observatory Director	Paul Borchardt	262-781-0169
Asst. Observatory Director	Jeff Kraehnke	414-333-4656
Newsletter Editor	Tamas Kriska	414-581-3623
Webmaster	Gene Hanson	262-269-9576

Board of Directors

Jim Bakic	414-303-7765
Scott Berg	262-893-7268
Russ Blankenburg	262-938-0752
Clark Brizendine	414-305-2605
Jason Doyle	414-678-9110
John Hammetter	414-519-1958
Jeff Kraehnke	414-333-4656
Jim Schroeter	414-333-3679
Gabe Shaughnessy	262-893-4169
Steve Volp	414-751-8334
Mike Wagner	262-547-3321

August Keyholders

08/03	Gene Hanson	262-269-9576
08/10	Jeff Kraehnke	414-333-4656
08/17	Tamas Kriska	414-581-3623
08/24	Tom Schmidtkunz	414-352-1674
08/31	Sue Timlin	414-460-4886