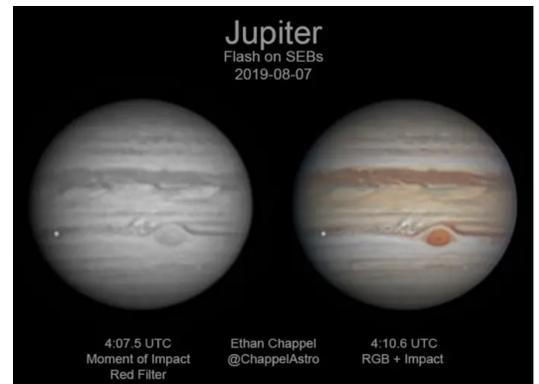




## May Meetings

The next **Membership Meeting** will be on Monday, May 17<sup>th</sup> from 8 PM via Zoom. The first part will be a business meeting where we elect new members to the Board of Directors. The new Board then elect the Officers. Any member can be nominated or self-nominated. In the second part **Lee Keith** will give a presentation: Discovering impacts of small objects on Jupiter and Saturn.

*The giant planets Jupiter & Saturn have been hit by small objects (5-20 m in size) several times in the last decades. Objects of this size are too small to leave any observable feature in the atmosphere but when they collide with the planet they produce short flashes of light of 1-2 seconds that can be seen using small telescopes and recorded in video observations of the planet. Studying these objects we hope to learn about the potential of Jupiter in protecting the Earth from impacts with small asteroids and comets and also about the population of small objects in the outer solar system. Will also investigate software, called DeTeCt, used to find these impacts in video streams taken by a growing group of international amateur astronomers.*



As always, the **Board Meeting** will be held right before the Membership Meeting, from 7 PM, and is open to every MAS member who is interested in organizational and Observatory related issues.

The **Astrophotography Interest Group** will meet on Wednesday, May 12<sup>th</sup> at 7 PM through Zoom videoconference.

The **First Wednesday (How to) Meeting** will be held through Zoom videoconference on May 5<sup>th</sup>, from 7:30 PM. This is an informal meeting to discuss technical aspects of astronomy, however, any astronomy-related topic can be brought up. New members are especially encouraged to attend this meeting. It is a chance to receive tips on how to get started and/or get more involved in the Club's activities.

Invitations will be sent out prior to meetings.

The MAS Google Group is as active as ever. Learn about the astronomical news, follow equipment related discussions, or just check out the latest images taken by fellow Club members.

## MAS Election

At the beginning of the Membership Meeting we will elect new Board Members and Officers. Three positions will be open, since the first term of two Board members, and the second term of one Board member will be expired.

If you are interested in serving a three year term in the Board of Directors, or a year as an Officer, please contact any Board Member or Officer.

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## Observatory Director Report

There was no official Report submitted.

The Board discussed the following items:

- The 12" Meade LX200 telescope is being converted into a planetary- and medium level deep sky imager, which will be remotely controlled from the Z building's control room.



- The broken street sign at the west side of the entrance was repaired.
- We most likely have a bigger rodent above the ceiling panels of A building. Live traps will be placed.

## Treasurer's Report

<b>\$11,118.48</b>	<b>Starting Balance as of 03/13/2021</b>
	<b><u>Expenditures</u></b>
\$8.55	PayPal fees
\$112.15	WE Energies
\$36.00	Water/Sewer
\$156.70	TOTAL Expenditures
	<b><u>Revenue</u></b>
\$456.00	Membership dues
\$1.00	Grants
\$457.00	TOTAL Revenue
<b>\$11,418.78</b>	<b>Ending Balance as of 04/17/2021</b>

Respectfully Submitted,  
Sue Timlin, Treasurer

## Membership Report

Since the last Report we received 6 new membership applications. We welcome Holly Steffers & family, David Hansen, Jack Jorgensen, Kai Simone & Family, Jordan Brown & Family, and Joel Baumgarten & Family. The total number of active members is 180.

Respectfully Submitted,  
Jeff Kraehnke, Committee Chair

## Minutes

Due to the COVID-19 the February Board Meeting was held via Zoom videoconference on March 15<sup>th</sup>. The meeting was called to order at 7:03 PM by Tamas Kriska President.

**Minutes, and Treasurer's Report** electronically submitted ahead of the meeting were approved.

**Observatory Director's Report** was not submitted. The Board discussed but not voted on the following issues: conversion of the 12" Meade LX 200 in the Tangney Observatory to a remote planetary and medium level DSO imaging scope; Mike Wagner fixed the broken west side street sign; rodent trap should be placed to the A-dome.

**Membership Committee Report** was submitted electronically ahead of the meeting. Membership applications of Rick Schaber, Matthew Zakrzewski & family, Tom and Holly Kelly & family, Antonio Vargas & family, Holly Steffes & family, David Hansen, Jack Jorgensen, and Kai Simone & family were approved.

**Old Business – Display box:** Yet to be purchased.

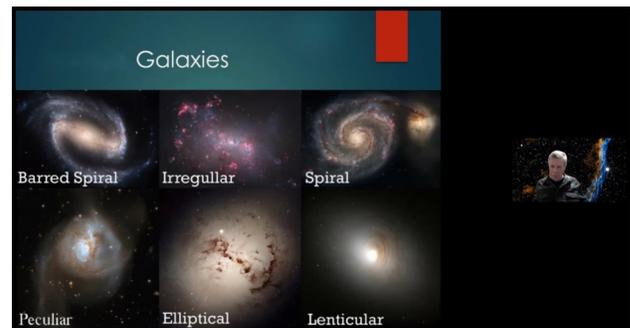
**Public Night:** The Open House Committee suggested September 10 and 24, and October 1 and 29. According to current safety guidelines, we will not have presentations. There are two volunteer speakers (Dennis and Lee) in case the situation improves. When the weather makes telescope viewing impossible, members manning telescopes are encouraged to get prepared with a short presentation about the history of the given shed/dome and scope.

**3D printed SCT collimators:** Mike Bauer investigated these collimators, and found they are not worth it.

**New Business – Re-roofing A dome:** Contractors will be contacted for quotes for rubber roofing.

**Announcement** – The next meeting will be on Monday, May 17<sup>th</sup>, 2021 via Zoom.

**Program** – Dennis Roscoe gave a presentation entitled Galaxies.



The meeting was adjourned at 9:30 PM.

Respectfully Submitted,  
Agnes Keszler, Secretary

## Beating the Seeing with “Lucky Imaging” (Part IV)

With the gradual improvement and affordability of digital cameras in the 1990s & 2000s, more amateurs were using them in their imaging efforts. But digital cameras would typically be used to take a single picture. This was not much better than film for planetary imaging. It was not until the invention of webcams that took videos that amateur imaging took off. They were cheap and perfect for planetary imaging because they took “movies” of many short images in quick succession. It was found that while many of the images still showed the blurring effects of the atmosphere, some were fairly good and some were downright sharp!

How could this be? Atmospheric blurring is not uniform and is caused by seeing cells of varying sizes. If cells smaller than the aperture of your telescope were in front of the planet when you took your exposure, it would be blurry. If the cells were larger, less blurry or even sharp. Not only that, depending on the size of the cells, part of the image could be sharper than other parts. What a mess!

In addition, single images had lots of electronic “noise” caused by various limitations of the electronic sensor. This noise also blurred fine details on a planet’s disk. It had been known since the 1940s that stacking multiple images of the same object would reduce this “noise” even for pictures taken with film, but it was difficult to stack more than a few film negatives before the image became too dark and the registration or alignment between images became increasingly difficult.

In the early days of digital imaging, astronomers had to examine each image in their movie containing hundreds, then thousands of individual pictures to pick the best dozen or so, then use rudimentary graphics software to painstakingly align and stack each image. While easier than film, it was still a tedious, time consuming process. The effort paid off because the images were amazing!

The success of the early pioneers encouraged amateur astronomers to write software that automated the processing of all these images. One of the early entries was Registax, which, like the name infers, registers (aligns) and stacks images. Not only that, it will look at each image, determine how “good” it is and keep only as many of the best one you specify. It will even process the stacked image in various ways, including a sharpening method called wavelets, which is still used today, though the selection & stacking is better done with more modern software like AutoStakkert.

The acquisition of the AVI or SER “movie” is also done with software. Sometimes this software will come with the camera or you can use FireCap-

ture which has more features and has become the “industry standard” to record planetary imaging data.

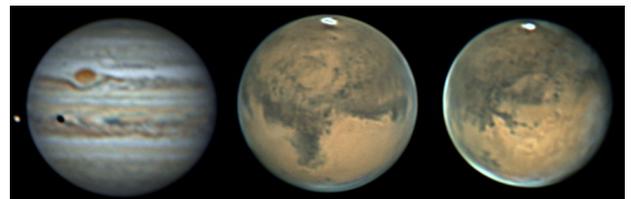
The really amazing part of this story is that all the software mentioned above, which is all that I use to get my amazing images of the planets, is free! Yes, you read correctly, FREE! Thanks to other amateur astronomers who are passionate about our hobby, who have or acquired expertise in image processing, are skilled programmers and who also are willing to spend a lot of their time to write the software so we don’t have to do everything manually.

Amateur astronomy is truly a global enterprise! The author of RegiStax, Cor Berrevoets, is Dutch as is Emil Kraaikamp, the author of AutoStakkert. The author of FireCapture, Torsten Edelmann is German. Well known imagers include Damian Peach from the UK and Christopher Go from the Philippines.

So what can all this free software do for us? Well, instead of the blurry images that took a lot of time, chemicals and sheer luck shown in a previous installment, we can now produce images that would have made a professional astronomer blush 30-40 years ago and that can rival space based images!!



If you were a member last year and were getting the google group posts, you followed me as I used this software and the MAS’ planet killer “A” scope to take amazing images of Jupiter and especially Mars at it’s very favorable opposition this past fall. I include a few samples below.



If these Mars images don’t take your breath away compared to the blurry images of the past, they should. The amazing part is that taking images like these does not take any particular skill,

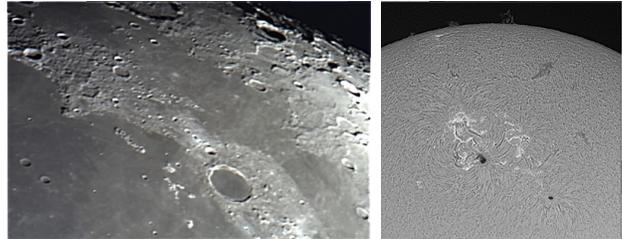
knowledge or super duper computer. You just have to be willing to come out to the observatory. The MAS can supply you with everything else. Telescope, camera, accessories, even computer! You can even bring a USB flash drive to take your movie and images home with you. Yes, it will be dark. Yes, it may be late (or early). But you already knew that when you joined, didn't you?

This method of taking many short exposures and stacking only the best ones has been dubbed "lucky imaging" but luck has little to do with getting good images. The trick to getting excellent images like these is not the equipment or the software. The best telescope, camera, software or processing cannot make a blurry image sharp. It's the willingness to come to the observatory enough times until you encounter a night with good seeing.

While it is easy, it still requires some guidance & practice which I and other MAS imagers are willing to work with you to achieve. That being said, it is best to start early so that when the planets Jupiter & Saturn reappear this summer, you will be ready.

The first thing most new members want to do is take a picture of the sky. A very common question

we get after "What telescope should I buy?" is "How can I take a picture of...?". Well, here is your chance! You have many opportunities to pursue imaging. You can attend the 1st Wed Zoom meetings on the first Wednesday of the month. There is also the weekly Member Nights where you can come out to the observatory and talk about your interests or learn about the equipment with the Keyholder in attendance. Announcements are sent out Friday and/or Saturday on the google group email. All you have to do is ask!



By the way, you can also take stunning images of the Sun and Moon using this process and the Sun is up during the day so you won't miss any sleep! Hope to see you soon!

Lee Keith

## Member's Achievement

### Stellar Shot of the Week: April 16, 2021 by William Gottemoller

Congratulations to this week's StellarShot selection, which is a spectacular monochrome shot of the California Nebula by William Gottemoller. This image is made up of twenty-five 10min exposures, all taken through the rather-rare SVQ100 which was an f/5.8 quadruplet we made a very small number of. William was fortunate enough to have access to some very cool gear through his membership with the **Milwaukee Astronomical Society**. William's processing is superb and really does justice to this intricate target, which came out sharp, low-noise, and beautifully detailed. Thanks for sharing your work with us William, and we invite everyone else to please make sure you submit your own images to us directly by email, or by tagging them with #stellarvue and #stellarshot.

-Integration: 25x10 mins in Ha of NGC 1499 (Calibration: 15x10 mins dark, 15 flats, 15 biases)

-Scope: Stellarvue SVQ100 F5.8 Astrograph on an Astrophysics GTO900 mount

-Camera: ZWO ASI 1600 Pro MM

-Software Used: Sequence Generator Pro, The SkyX Pro, PHD2 Guiding, DeepSkyStacker, Photoshop

-Facilities were all on-site at the MAS Observatory using a setup known as "F-scope"

stellarvue.com



## MAS Observing Sites

There has been quite an enthusiastic response to the visual observing poll. Now that there is a interest in observing at darker sites than the observatory, I want to share some sites that MAS members can use to do observing from. The state parks require a vehicle sticker and all expect to see astronomers there so you should not have any problem being there at any time of night. There is a "permission slip" for possible use at Ottawa Lake if someone checks on you. (There are copies of this slip on the back table in the auditorium in the Quonset at the observatory) All have pit toilets available but may not have water easily available so bring your own. Energy drinks are a good idea for a long night.

When you do come, I would highly recommend that you arrange to arrive just before sunset which will give you enough time to setup your scope in the light and get situated. Then everyone can see it in the light and we can talk a bit. Don't forget to bring a dimmed, red flashlight or headlamp (better) as white lights are frowned upon during a "star party".

**Harrington Beach State Park** (On Lake Michigan between Port Washington & Sheboygan)

<https://www.google.com/maps/@43.4950567,-87.8136783,14.67z?hl=en>

Go to upper parking lot marked by star on map.

**Ottawa Lake State Recreation Area** (In the Southern Kettle Moraine north of Eagle, WI)

<https://www.google.com/maps/place/Ottawa+Lake+Campground+Visitor+Center/@42.9528381,-88.3510791,11.75z/data=!4m5!3m4!1s0x8805b8a948c49f51:0xf9fc49364932a159!8m2!3d42.9370937!4d-88.4747065?hl=en>

Go all the way back around all beach & picnic areas to boat landing parking lot on the lake marked on the map.

**White Mound County Park** (Sauk County NW of Madison & north of Plain, WI)

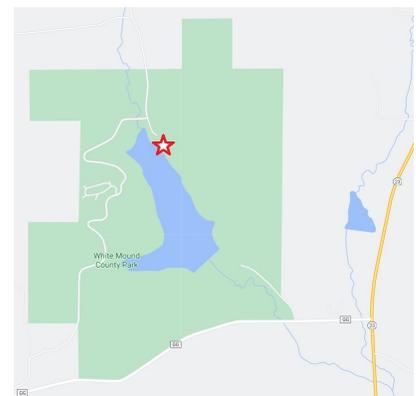
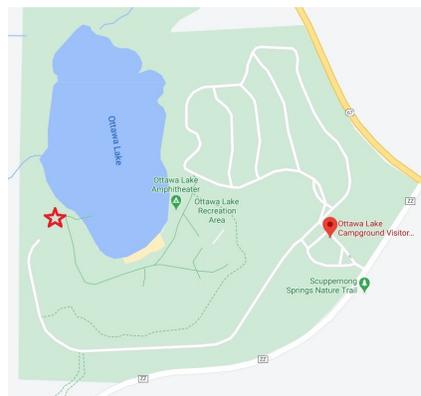
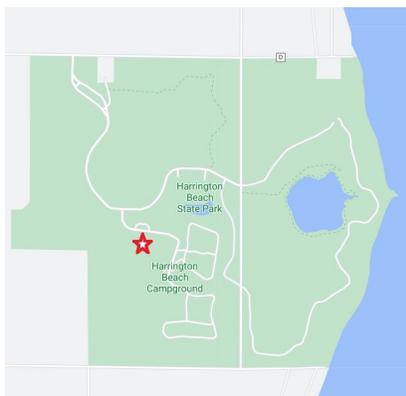
<https://www.google.com/maps/@43.350145,-90.0682408,12.63z?hl=en>

<https://www.co.sauk.wi.us/parksandrecreation/white-mound-park>

Go past park pavilion & campground around lake to boat landing parking lot marked on map.

Please save this message for future reference. Remember that you can go to any of these sites at anytime and need not wait for an "official" MAS announcement. If anyone else has a dark site that the general public can go to observe please let us know and we can add it to the MAS list.

Lee Keith



## In the Astronomical News

### NASA's Mars Helicopter Ingenuity Takes off on Historic 1<sup>st</sup> Powered Flight on Another World

The aerial exploration of Mars has begun. NASA's Ingenuity helicopter lifted off on the Red Planet early morning of April 19, performing the first-ever powered flight on a world beyond Earth. The 4-lb. (1.8 kilograms) chopper was scheduled to rise from the floor of Mars' Jezero Crater at 12:31 a.m. EDT (0431 GMT) today, get a maximum of 10 feet (3 meters) above the red dirt and land after roughly 40 seconds aloft.

At about 6:15 a.m. EDT (1015 GMT), data came down from Ingenuity — via its much larger partner, NASA's Perseverance rover — that the little rotorcraft had hit its marks. The first photo from Ingenuity showed the helicopter's shadow on the Martian surface below, while Perseverance captured stunning video of the historic flight on Mars. "Ingenuity has performed its first flight, the first flight of a powered aircraft on another planet!" Ingenuity's chief pilot Håvard Grip said as he confirmed telemetry at NASA's Jet Propulsion Laboratory in Pasadena, California.

Brief though this flight was, it may well be game-changing, paving the way for extensive exploration by Martian aircraft down the road. Thanks to Ingenuity's groundbreaking work, future Red Planet missions could commonly include choppers as scouts for rovers or data collectors in their own right, NASA officials have said. The core team behind Ingenuity's pioneering flight watched today's Mars flight from a control room at NASA's Jet Propulsion Laboratory in Pasadena, California. They stood, threw up their hands and cheered as the flight's success was confirmed.

MiMi Aung, Ingenuity's project manager, triumphantly tore up her contingency speech (written in case of a failure) and hailed Ingenuity's historic feat on Mars. Every planet, she's said in the past, gets only one first flight. "We can now say that human beings have flown a rotorcraft on another planet!" Aung said as her team cheered. "We've been talking so long about our Wright brothers moment on Mars, and here it is."

NASA named Ingenuity's Martian airfield Wright Brothers Field after Orville and Wilbur Wright, who performed the first heavier-than-air

flight on Earth in 1903. There's also a piece of their Wright Flyer plane on Ingenuity to mark the event. Because of COVID-19 pandemic restrictions, much of Ingenuity's mission team watched today's event via a WebEx video conference. Aung sent them all remote hugs of success. "You know I'm hugging you virtually," Aung told her team.

Ingenuity will fly again soon, if all goes according to plan — up to four more times, in fact, during its month-long window. The helicopter will likely go slightly higher and farther on flights two and three, getting up to 16.5 feet (5 m) off the ground and moving a maximum of 165 feet (50 m) downrange, Aung said during a news conference

earlier this month. If Ingenuity aces those next two flights, sorties four and five could be "really adventurous," she added.

"History does tell us that soon after their first flight, Orville and Wilbur did go right back to work," Aung said today of the Wright Brothers' famous experiment at Kitty Hawk, North Carolina, on Dec. 17, 1903.

They flew three more times that day, each one higher and farther than the last, she added. "This is just the first great flight," Aung said. "Congratulations, take a moment and then let's get back to work!"

Perseverance will serve as support during the entire flight campaign; communications to and from Ingenuity must go through the rover, after all. But that campaign is hard-capped at one month in duration, because Perseverance needs to focus on its own work soon. That work has two main components — hunting for evidence of ancient Mars life on the floor of the 28-mile-wide (45 kilometers) Jezero, which hosted a lake and a river delta billions of years ago, and collecting and caching dozens of samples. Those samples will be hauled to Earth by a joint NASA/European Space Agency campaign, potentially as early as 2031. Scientists around the world will then be able to analyze the pristine Mars material in far greater detail than Perseverance ever could, capable and complex though the rover is.

Mike Wall space.com



*Image from Perseverance rover on Mars shows the Mars Helicopter Ingenuity hovering above the surface during its historic first flight on April 19, 2021. (Credit: NASA TV)*

## Adopt a Telescope Program - Signup Sheet

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

### 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
Mike Bauer	262-894-1253
Jill Roberts	262-765-7092
Clark Brizendine	414-305-2605
Jason Doyle	414-678-9110
Dennis Roscoe	608-206-0909
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

#### May Keyholders

05/01	Jeff Kraehnke	414-333-4656
05/08	Tamas Kriska	414-581-3623
05/15	Jill Roberts	262-765-7092
05/22	Jim Bakic	414-303-7765
05/29	Mike Bauer	262-894-1253



### MAS Observatory

18850 Observatory Rd  
New Berlin, WI 53146

[www.milwaukeeastro.org](http://www.milwaukeeastro.org)