

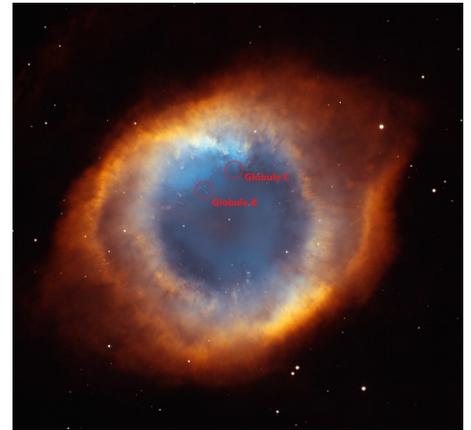


December, 2021

## January Meetings

The first **Membership Meeting** of 2022 will be on Monday, January 17<sup>th</sup> from 8 PM via Zoom videoconference. MAS member Lucy Steffes will give a presentation entitled: *The Chemical Composition of the Helix Nebula Globules*. Lucy is a sophomore at UW-Madison double majoring in aerospace engineering and astrophysics. This summer, she had the privilege of completing a remote internship at the Green Bank Observatory.

*This project uses data from the Atacama Large Millimeter Array (ALMA) to examine the structure of two small, dense clumps of gas, here referred to as Globules B and C, within the ionized region of the expansive, molecule-rich shell of the Helix planetary nebula (NGC 7293 - right). Twelve molecular transition lines were studied, including isotopologues of CO, and transitions of C<sub>2</sub>H, HCN, HCO, and HNC. Analysis of the integrated intensity, column density, and velocity distribution of each molecular line indicates that higher densities are found closest to the central star, with more diffuse gas trailing radially outward. 12CO appears the most abundant molecule, and is optically thick across both globules. Lower energy transitions of HCN, HNC, and HCO are also found throughout the globules, though centered predominantly around the higher density gas in the heads. The remaining*



*molecular transitions are similarly relegated to the clumpy distribution of dense cores throughout the globules. Analysis of the distribution and spread of these molecules also indicates that Globule B is composed of several smaller globulettes, each with an individual dense head that is connected by trailing gas. Line ratios of molecules detected at multiple transitions suggest that higher energy transitions are more readily excited toward the central star-facing surface of the globule, with lower transitions found more broadly throughout the globules. (Left - Lucy with her research mentor, Dr. Jesse Bublitz at the Green Bank Observatory)*

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 **First Wednesday meeting** will be held in person at the Observatory on January 5<sup>th</sup> from 7:30. New members are especially encouraged to attend this meeting. It is a chance to gain hands-on experience, receive tips on how to get started and/or get more involved in the Club's activities.

The **Astrophotography Interest Group** will meet on Wednesday, January 12<sup>th</sup> at 7 PM through Zoom videoconference. The invitation will be sent out before the meeting.

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.

## Membership Renewal: Last Call

It is still not too late to renew your membership. Just follow this link:

<http://milwaukeeastro.org/membership/masRenewal.asp>

Do I need to renew my MAS membership? Simply look for your name on this list:

[http://milwaukeeastro.org/membersRenewed.asp](http://milwaukeeastro.org/membership/membersRenewed.asp)

If your name is there, your membership is active through 2022.

**MAS depends on its members and their dues to help sustain one of the largest amateur astronomy club in the US that has been around for the past 89 years!**

Thank you for being a member of the Milwaukee Astronomical Society.

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## Observatory Report

The installation of new ZWO cameras, an ASI2600 for the F-scope and an ASI6200 for G-scope have been completed, and the scopes are back in use.



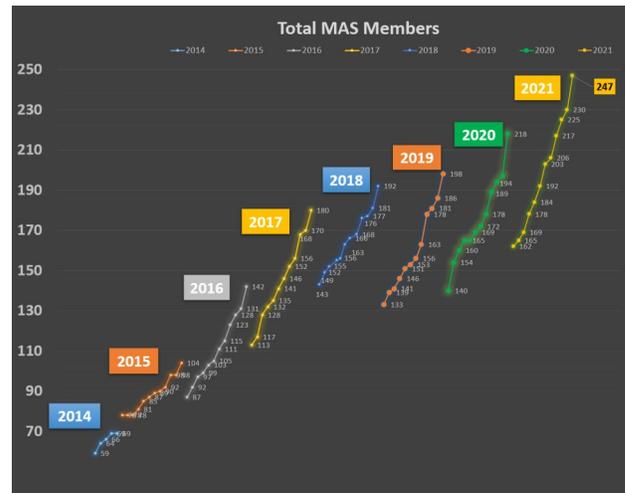
## Treasurer's Report

<b>\$8,499.39</b>	<b>Starting Balance as of 11/13/2021</b>
	<b>Expenditures</b>
\$57.11	PayPal fees
\$77.62	WE Energies
\$134.73	TOTAL Expenditures
	<b>Revenue</b>
\$449.99	Private Donations
\$2,085.00	Membership dues
\$10.00	Grants
\$2,544.99	TOTAL Revenue
<b>\$10,909.65</b>	<b>Ending Balance as of 12/27/2021</b>

Respectfully Submitted, Sue Timlin, Treasurer

## Membership Report

Since the last Report we received 17 new membership application. We welcome Will Pergande & Family, Jeff Steiner, Owen Gabrysiak & Family, Allen Roeker & Family, Mark Blado & Family, Stan Piepenburg & Family, John Schober, Melissa Schober, Christine Pilacek, Lora Blasius, Brianna Burt & Family, Jacob Davida & Family, Andrew Goff & Family, Jon Ludwig & Family, Larry Armfield, Scott Bower & Family, and Spencer Barron. The total number of active members is 247.



The graph shows the remarkable increase of the monthly MAS membership numbers over the last eight years.

Respectfully Submitted,  
Jeff Kraehnke, Committee Chair

## Astronomical Events of the Month

**Jan 2: New Moon** - The Moon will be located on the same side of the Earth as the Sun and will not be visible in the night sky. This phase occurs at 18:35 UTC. This is the best time of the month to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.

**Jan 3-4: The Quadrantid Meteor Shower** - is an above average shower, with up to 40 meteors per hour at its peak. It is thought to be produced by dust grains left behind by an extinct comet known as 2003 EH1, which was discovered in 2003. The shower runs annually from January 1-5. It peaks this year on the night of the 3<sup>rd</sup> and morning of the 4<sup>th</sup>. The thin, crescent moon will set early in the evening leaving dark skies for what should be an excellent show. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Bootes, but can appear anywhere in the sky.

**Jan 7: Mercury at Greatest Eastern Elongation** - The planet Mercury reaches greatest eastern elongation of 19.2 degrees from the Sun. This is the best time to view Mercury since it will be at its highest point above the horizon in the evening sky. Look for the planet low in the western sky just after sunset.

**Jan 17: Full Moon** - The Moon will be located on the opposite side of the Earth as the Sun and its face will be fully illuminated. This phase occurs at 23:51 UTC. This full moon was known by early Native American tribes as the Wolf Moon because this was the time of year when hungry wolf packs howled outside their camps. This moon has also been known as the Old Moon and the Moon After Yule.

## The Year 2021

As 2021 comes to an end it is time to reflect on the events and achievements of the year. Even though the COVID-19 pandemic stayed with us, we tried to return to normal as much as possible. The Observatory stayed open on Saturday nights, the First Wednesday meetings returned to an in-person format, and we even had a very successful Public Night (the Halloween-themed second one was ruined by a rainy weather). The Board and General Membership meetings as well as the Imaging Interest Group meetings stayed on the Zoom platform and were well attended. The meetings were recorded and posted to the MAS' YouTube channel where some of them became very popular with hundreds of views. The most popular video about James Webb Space Telescope achieved more than 17K views! The Google group was very active throughout the year. Unfortunately, for the second consecutive year the Summer Picnic and the Christmas Party were cancelled.

The Saturday Member's Nights, especially during the summer and fall months with mild weather, were popular. On clear nights 20-25 members came out to use the Club's equipment. On many sunny weekend mornings the Solar Observatory was open for solar viewing.

New members were joining the Club again in record breaking numbers. We welcomed 85 new members in 2021 with 17 new membership applications in December alone. The current membership number of 247 is as high as it was never before. The Society celebrated the 50<sup>th</sup> anniversary of Gerry Samolyk and Paul Borchardt becoming members, but we also mourned two of our longtime members Rudy Poklar and Scott Laskowski.

There were relatively few memorable astronomical events in 2021. A partial Lunar Eclipse and an Annular Solar Eclipse happened in such inconvenient time of the day that only the most dedicated members could observe them. The unexpected appearance of a relatively bright comet C/2021 A1 Leonard held some promise but at the end it turned out to be a dud. We still managed to organize a couple Star Parties at Harrington

Beach and Ottawa Lake State Parks as well as at White Mound County Park. A Messier Half Marathon coupled with an eVscope demonstration generated lots of interest.

Among space exploration events the landing of Perseverance on Mars and the launch of James Webb Space Telescope were the most interesting.

During this year's election meeting in May the MAS membership elected Lee Keith as a Board Director. The new Board then elected Jeff Kraehnke as Vice President and re-elected all other Officers for another one year term.

Many items of the Observatory equipment were upgraded. The main project was the replacement of cameras on both F-scope and G-scope, which highly improved their imaging capabilities. The 18" Obsession telescopes were overhauled. One of the Obsessions was replaced by a donated Celestron 9.25" GOTO telescope. The Clubs DSLR cameras received new power supplies. The old LX200 fork mount was fixed and made autoguidable. A-scope counterweights received a padded cover for improved safety.

The maintenance work on the Observatory grounds has also continued. The main item was the replacement of A-dome's leaky shingle roof with a rubber one. At the same time Z-dome's rubber roof edge was repaired by a professional contractor. We also organized a work party to empty, cut, and dispose of the oil tank for the old furnace that have been sitting behind the Quonset Hut for more that 25 years. The broken street sign was repaired, as well as the east portion of the entrance gate. Tree stumps around the septic tank were removed. B-dome slit's lower door cables were repaired. Flooring edge was reattached in A-dome. WE trimmed the trees in the parking lot along the power line.

We changed our website host from DiscountASP to SmarterASP.

Thank you everyone for all the contributions and being a member of the Milwaukee Astronomical Society. We wish all of you a Happy New Year!

## In the Astronomical News

### Scientists Observed This Ghostly Galaxy For 40 Hours And Couldn't Find Any Dark Matter

A new discovery has deepened the mystery of galaxies without dark matter. In a galaxy named AGC 114905, 250 million light-years away, astronomers could find no trace of the mysterious stuff. "This is, of course, what we thought and hoped for because it confirms our previous measurements," said astronomer Pavel Mancera Piña of the University of Groningen and ASTRON in the Netherlands. "But now the problem remains that the theory predicts that there must be dark matter in AGC 114905, but our observations say there isn't. In fact, the difference between theory and observation is only getting bigger."

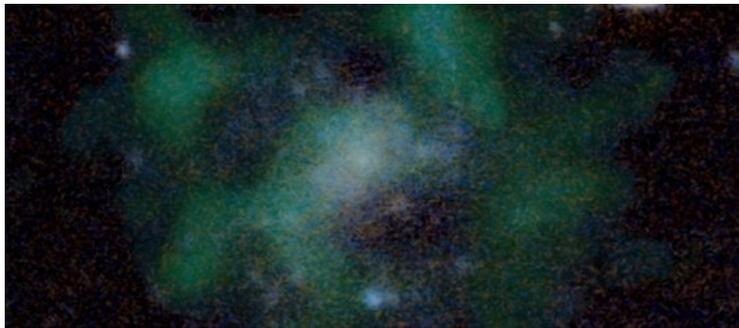
Dark matter is one of the big mysteries of the Universe. We don't know what it is because we can't detect it directly, but we know there's some mass out there causing a range of effects in the Universe that can't be explained

by normal matter alone. Stars, for example, orbit their galaxies with a higher velocity than can be explained by the gravitational field of normal matter. The way the path of light bends as it travels through massive gravitational fields in intergalactic space is another. There's an invisible dark matter web spanning the Universe, and the gravity it generates helps normal matter come together into galaxies. And, according to our models, dark matter also helps these galaxies stay together. But astronomers have been finding hints of galaxies without dark matter in recent years, in contravention of how we believe the Universe exists. So, when Mancera Piña and his colleagues found six galaxies seemingly without dark matter, described in a 2019 paper, they decided to take a much closer look.

AGC 114905 is an ultra diffuse dwarf galaxy. It's about the size of the Milky Way, but much, much less luminous, containing far fewer stars – around a thousand times fewer. Because they have so little normal matter, these galaxies ought to be held together by dark matter.

So the researchers took a closer look at AGC 114905 using the NRAO's Very Large Array in New Mexico, obtaining a total of 40 hours worth of observation data at a much higher spatial resolution.

Then, they very carefully plotted the rotation curve of the galaxy – the orbital speed of the objects in AGC 114905, plotted against their distance from the galactic center. This is one of the most common methods for calculating the amount of dark matter in a galaxy: objects orbiting too quickly can be explained by adding dark matter, and the amount of dark matter influences the additional orbital velocity. But the rotation curve of AGC 114905 doesn't require the presence of dark matter. One explanation, for instance, would be if a nearby massive galaxy had stripped AGC 114905 of its dark matter, as seems to be the case



AGC 114905, with stellar emission in blue and neutral hydrogen in green.  
Credit: J. Roman and P. Mancera Pina

of another diffuse galaxy discovered to have no dark matter, DF4. "But there are none," Mancera Piña said. "And in the most reputed galaxy formation framework, the so-called cold dark matter model, we would have to in-

troduce extreme parameter values that are far beyond the usual range. Also, with modified Newtonian dynamics, an alternative theory to cold dark matter, we cannot reproduce the motions of the gas within the galaxy."

In cases of other galaxies with abnormal amounts of dark matter, it could be that we have simply misjudged the distances. But the distance to AGC 114905, the researchers said, is well constrained. It's possible that the estimated observation angle could be off; that could explain the apparent lack of dark matter. But it would have to be off by quite a huge margin. In addition, all six galaxies from their initial studies showed similar behavior, at a range of different inclinations. This suggests that the behavior is not the result of a systematic error, they said. They are currently conducting a detailed follow-up on a second ultra-diffuse galaxy to try and get to the bottom of it. If confirmed, their findings could have very interesting implications for our understanding of galactic evolution. The present work has also shown that gas-rich ultra-diffuse galaxies are a promising population to study dark matter, as they can potentially provide telltale clues to understand its nature."

Michelle Starr, sciencealert.com

## 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	Jeff Kraehnke	414-333-4656
Treasurer	Sue Timlin	414-460-4886
Secretary	Agnes Keszler	414-581-7031
Observatory Director	Paul Borchardt	262-781-0169
Asst. Observatory Director	Russ Blankenburg	262-938-0752
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
Lee Keith	414-425-2331
Jim Schroeter	414-333-3679
Gabe Shaughnessy	262-893-4169
Steve Volp	414-751-8334
Mike Wagner	262-547-3321

#### January Keyholders

1/1	New Year - Observatory closed	
1/8	Lee Keith	414-425-2331
1/15	Jeff Kraehnke	414-333-4556
1/22	Tamas Kriska	414-581-3623
1/29	Tom Schmidtkunz	414-352-1674



### MAS Observatory

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

