MILWAUKEE ASTRONOMICAL SOCIETY

FOCAL POINT

April, 2015

April 17th: Membership Meeting at Retzer Nature Center in Waukesha

Bill Hirsch

The upcoming General Membership Meeting will be held on April 17th, at 8:00 PM at the main auditorium of the Retzer Nature Center (see the map on the MAS website). The speaker of the night will be **Dr. Bill Hirsch,** an Assistant Professor at the Physics Department at the Marquette University. Bill will talk about the General Theory of Relativity.

The General Membership Meeting will be preceded by a Board Meeting from 7:00 PM, open for anybody who is interested.

100 years of Einstein's General Relativity

Albert Einstein radically updated Sir Isaac Newton's laws of motion, and subsequent implications, with his Special Theory of Relativity in 1905, forever changing the way physicists view time and space. At the time though, Einstein knew that a more fundamental theory of nature must exist, since Special Relativity restricts observers to non-accelerating points of reference. It took him 10 whole years to include the accelerations caused by the fundamental force of gravity and hence, in 1915 Albert Einstein put forth one of the grandest achievements of the human mind, his General Theory of Relativity. My talk will focus on important milestones in the theory and how it is fundamental to our understanding of the cosmos. I will start by discussing the theory's controversies, bazaar predictions and experimental triumphs. Then I will highlight various astrophysical phenomena explained or predicted by the theory including black holes, wormholes, neutron stars, gravitational waves, the big bang, and the overall structure and evolution of the universe.

Inside this issue:

First Public Night on April 24th at 7:30 PM

This year we will try a new format. Instead of a single topic the presenters will talk about several prominent objects visible on that night. The emphasis will be on helping the guests to find those object on the sky and to explain how they might appear in the eyepiece. The speaker of the first night will be **Lee Keith**.

The evening, as usual, will include a tour of the Observatory and viewing thru the telescopes if the weather permits. We will collect a parking donation of $5/vehicle. The event will be held in rain, shine, and starlight. The kind help of MAS members during the night is encouraged and highly appreciated.

Observatory Report

Genuine activity at the observatory has returned with the more spring-like weather. I have swapped out the old yard lock, which was keyed (aka the yard key) with a combination lock. The combination was sent out to the membership. The roof of the Z-dome needs to be replaced. Materials for the 400 sq feet would be in the $500-600 range.

Website Report:

Our yearly dues for the hosting of our website at Discount.ASP came due and I paid them as a donation.

It was pointed out that some of our club's information on various websites is obsolete. Some of these I was aware of, but one of them was new to me. Updating these sites is often an exercise in frustration, yet still worth the effort and don't ever hesitate letting the webmasters know (at webmaster@milwaukeeastro.org) if you see anything. One very irritating one that is inexplicably wrong is on the Astronomy Magazine site as they have a way to communicate updates right there where they list the information. In their case they have a direct link to our website, which is wrong. Though I would like them to correct this, I have circumvented the problem by allow that particular URL and then have it redirect to our main page.

Respectfully Submitted,
Gene Hanson, Observatory Director

Treasurer's Report

$2,039.85	***Starting Balance as of 2/18/2015***
	Expenditures
$120.31	WE Energies
$150.00	Dr. Thaller
$10.00	WI Dept of Finance
-$280.31	TOTAL Expenditures
	Revenue
$170.00	Donation-Cub Scouts
$46.00	Membership Dues
$216.00	TOTAL Revenue
$1,975.54	***Ending Balance as of 3/25/2015***

Respectfully Submitted,
Dennis Roscoe, Treasurer

Meeting Minutes

Held on March 27th at the Retzer Nature Center, Waukesha. The meeting was called to order at 8:00 PM by President, Scott Jamieson.

Minutes of the previous meeting, **Treasurer's Report**, **Observatory Director's Report**, and the **Membership Report** were submitted electronically in advance (see this page), therefore were not read.

Old Business - Discussion about the potential investments to improve the Club's capabilities has been continued. Scott Jamieson suggested to remove the Z-scope, transform its mount into a pier and place the Astrophysics GTO 900 mount donated by Gene Hanson holding a new 14" Celestron EdgeHD optical tube.

New Business - $800 was approved to replace the roof of Z dome.

The Program Michelle Thaller gave a presentation entitled "Small Worlds, Big Discoveries".

The meeting was adjourned at 9:15 PM.

Respectfully Submitted,
Agnes Keszler, Secretary

Membership Report

Since the February Membership Report we didn't receive any new membership applications.

We now have 78 MAS members.

One of those members deserves a special mention. Father Milton Lange is our oldest member having joined the MAS back in 1940! Therefore, this marks his 75th year as an MAS member. He was elected to Founder Member status back in 1988. He lives in Springdale, Arkansas, and is a retired Catholic Priest.

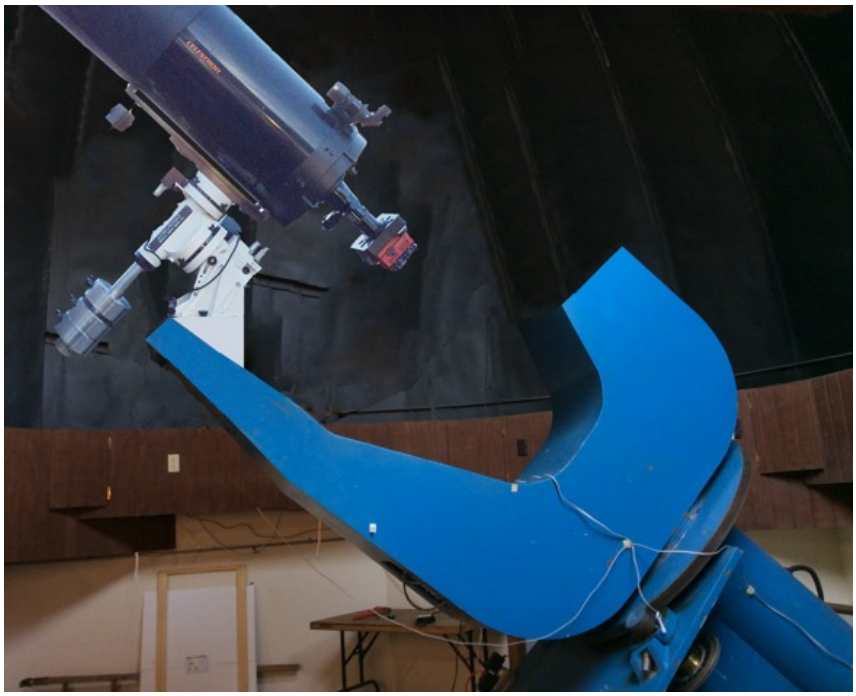
Respectfully Submitted,
Tamas Kriska, Committee Chair

Observatory News

The Z-dome Telescope Project

As many of you have already heard, The Observatory Committee is proposing to retire the massive 25 inch Cass telescope called Z scope in favor of making changes that would allow us to install an Astrophysics GTO 900 mount and a new 14 inch Celestron EDGE telescope capable of F/11, F/7 and F/2 operation for imaging.

I am very aware of the history of this telescope and have a high respect for the members who worked so hard to build the telescope and the dome that encloses it. I count myself in this group because, despite the fact I was not a member when it was first constructed, I have worked on and used this telescope a great deal in the 27 years I have been a member of this club. Some of my efforts have included:



Artist impression of the final look of the new telescope. Credit: Dennis Roscoe.

1) completely redesigned and updated the drive electronics.
2) converted the drive motors and electronics to Servo motors.
3) attempted to convert the drive roller gearing to worm drives to get smoother movement with much less slop than the old belt drives.
4) Designed and built the new front end ring and secondary replacing camera mounts to allow F/3 Narrowband imaging to overcome the high level of light pollution on the hill.

As a result of these efforts, the Observatory Committee and I have concluded that it is time that Z scope should be replaced with modern high quality equipment that can be used to do state-of-the-art work. I have done everything I can to bring Z up to the standards of modern amateur astronomy, but even the conversion to F/3 operation turned out to be marginal because we still had the extreme thermal mass of the mirror and telescope, and the best images I did acquire had to be made late in the night when the mirror and scope settled down thermally, even with fan cooling. This was a major problem also when used at F/15 and on many open house nights I had to explain why the images of the planets in the 25 inch were nowhere near as good as those in B scope or the 18 inch Obsessions, which reach thermal equilibrium much more quickly. In the process of testing the Z scope I managed to overload and damage two worm gear boxes because the friction to drive the scope required 25 Ft lbs of torque, which makes smooth control impossible. I did attempt auto guiding but that cannot work well if the motions are not smooth and predictable. Typically, only 20 % of the sub-frames were usable due to tracking issues. It was an exercise in frustration.

There are some that say why don't we rebuild the scope and mount instead of scraping it. The answer is simple, even if there were someone left that has the proper background and is capable of and willing to do so, replacing all of the bearings is a

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Observatory News

massive job that may or may not improve the friction issues. Rebuilding the drive system again would involve much more massive, non -telescope type worm boxes that would not approach the precision required for imaging. The result would be a scope that is still too massive both thermally and mechanically to ever approach the quality of an Astrophysics mount and a Celestron EdgeHD telescope. It is well known in astronomy that a smaller telescope in a great mount will out-perform a larger telescope in a lesser one. In addition, I have been totally unable to get any information from members that worked on this scope that the friction in the axes was ever lower and more uniform than it is now.

It worked for visual observing in spite of the tremendous flexing in the belt drives but converting to any type of worm drive drastically increases the drag to the point that it cannot be driven precisely enough for imaging.

My final concern is a personal one. I will be retiring soon as President. If this change is ever to be done it has to be done while there are still people willing to do it. I consider my primary responsibility is to put the club in the best position possible to attract members and prosper in the future. Towards that end I intend to see that all of the scopes and observatories are in the best shape possible. The biggest unused asset we have is Z dome and it deserves to be the home of the best telescope system in the club. It is now a monument to the past but it should be more than that. The scope is now unusable and the Observatory Committee have no desire to expend any further effort toward another fruitless attempt that would only result in a waste of money and time.

Thanks to the generous donation by Gene Hanson, we have the Astrophysics mount. Thanks to the efforts of the original builders, we have a fantastic 22 foot dome. Thanks to the money donations made to the club over its history, we have the money to put a 14 inch Celestron EdgeHD telescope in place of the 25 inch. The Narrowband imaging system purchased for the F/3 project is perfect for this telescope and will allow imaging despite the high light level on the hill.

The attached image of the Astrophysics mount mounted on one tine of the original fork mount is the result of trying to minimize the heavy effort required to make this transition. The fork would be locked in a vertical position and the upper tine would be trimmed back to get the clear sky for the telescope. Obviously the fork would be locked down and serve as a rather elegant pier to place the telescope in the proper position to see out of the dome slit. While I can understand why this image would cause a cringe in most of the builders, I am trying to minimize the magnitude of the task and preserve as much of the mount as possible. I believe this is an effective solution.

The telescope would be completely controlled from the control room in the Z dome library area.

The Observatory Committee and I believe we should remember the past and take delight in its accomplishments. We do not believe that the club should be a slave to the decisions that were made in a very different context 30 years ago. We don't believe those that donated the money to make the Z scope would be saying 30 years later that the current club membership should not be allowed to make its own decisions to update or replace now. The money that we will be using is available now because of the generosity of all of the donors and fund raising that has gone on since then and was meant to be used for the clubs future.

To this end I believe that the total cost of the conversion and purchases required for the new telescope will be around $10,000. We can afford this easily and I believe if we don't do this now the club could eventually become irrelevant due to the lack of developing the advanced capabilities needed to attract members expecting significant advantages to being in the MAS.

The final decision to do this will be in the hands of the Board of Directors and we are open to the comments of the members. The plan is to try to make a decision on this issue in April or May and, if approved, start the project as soon as possible.

Scott Jamieson,
President

In the Astronomical News

The Solar System and Beyond is Awash in Water

As NASA missions explore our solar system and search for new worlds, they are finding water in surprising places. NASA science activities have provided a wave of amazing findings related to water in recent years that inspire us to continue investigating our origins and the fascinating possibilities for other worlds, and life, in the universe. In our lifetime, we may very well finally answer whether we are alone in the solar system and beyond.

The chemical elements in water are some of the most abundant elements in the universe. Astronomers see the signature of water in giant molecular clouds between the stars, in disks of material that represent newborn planetary systems, and in the atmospheres of giant planets orbiting other stars.

Water is found in primitive bodies like comets and asteroids, and dwarf planets like Ceres. The atmospheres and interiors of the four giant planets—Jupiter, Saturn, Uranus and Neptune—are thought to contain enormous quantities of the wet stuff, and their moons and rings have substantial water ice. Perhaps the most surprising water worlds are the five icy moons of Jupiter and Saturn that show strong evidence of oceans beneath their surfaces: Ganymede, Europa and Callisto at Jupiter, and Enceladus and Titan at Saturn. Scientists using NASA's Hubble Space Telescope recently provided powerful evidence that Ganymede has a saltwater, sub-surface ocean, likely sandwiched between two layers of ice.

Europa and Enceladus are thought to have an ocean of liquid water beneath their surface in contact with mineral-rich rock, and may have the three ingredients needed for life as we know it: liquid water, essential chemical elements for biological processes, and sources of energy that could be used by living things. NASA's Cassini mission has revealed Enceladus as an active world of icy geysers. Recent research suggests it may have hydrothermal activity on its ocean floor, an environment potentially suitable for living organisms.

While our solar system may seem drenched in some places, others seem to have lost large amounts of water. On Mars, NASA spacecraft have found clear evidence that the Red Planet had water on its surface for long periods in the distant past. More recently, NASA scientists using ground-based telescopes were able to estimate the amount of water Mars has lost over the eons. They concluded the planet once had enough liquid water to form an ocean occupying almost half of Mars' northern hemisphere, reaching depths greater than a mile. But where did the water go?

Mars' early atmosphere was stripped away by the wind of charged particles that streams from the sun, causing the planet to dry out.

The amount of water in the giant planet Jupiter holds a critical missing piece to the puzzle of our solar system's formation. Jupiter was likely the first planet to form, and it contains most of the material that wasn't incorporated into the sun. The leading theories about its formation rest on the amount of water the planet soaked up. To help solve this mystery, NASA's Juno mission will measure this important quantity beginning in mid-2016.

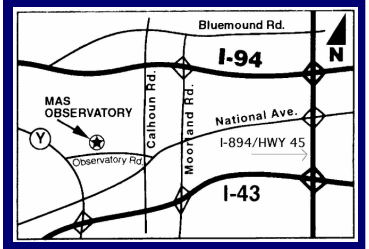
Recently verifying its thousandth exoplanet, Kepler data confirm that the most common planet sizes are worlds just slightly larger than Earth. Astronomers think many of those worlds could be entirely covered by deep oceans. Kepler's successor, K2, continues to watch for dips in starlight to uncover new worlds.

It's easy to forget that the story of Earth's water, from gentle rains to raging rivers, is intimately connected to the larger story of our solar system and beyond. But our water came from somewhere—every world in our solar system got its water from the same shared source. So it's worth considering that the next glass of water you drink could easily have been part of a comet, or an ocean moon, or a long-vanished sea on the surface of Mars. And note that the night sky may be full of exoplanets formed by similar processes to our home world, where gentle waves wash against the shores of alien seas.

by Preston Dyches at Phys.org

Adopt a Telescope Program - Signup Sheet

	Adoptee	Scope	Location
1	Sue Timlin	18" F/4.5 Obsession	Wiesen Observatory
2	Neil Simmons	12.5" F/7.4 Buckstaff	B Dome
3	Russell Chabot	12.5" F/9 Halbach	A Dome (Armfield)
4	Dan Yanko	18" F/4.5 Obsession (Kyle Baron)	Albrecht Observatory
5	Tamas Kriska	25" F/3.4 Zemlock	Z Dome
6	Henry Gerner	12" LX 200	Tangney Observatory
7	Vacant	8"/14" Celestrons	Ray Zit Observatory
8	Vacant	10" LX 200	Jim Toeller Observatory



MAS Observatory

18850 Observatory Rd
New Berlin, WI

www.milwaukeeastro.org

At Your Service

Officers / Staff

President	Scott Jamieson	262-592-3049
Vice President	Brian Ganiere	414-961-8745
Treasurer	Dennis Roscoe	608-206-0909
Secretary	Agnes Keszler	414-581-7031
Observatory Director	Gene Hanson	262-354-0138
Asst. Observatory Director	Jill Roberts	414-587-9422
Newsletter Editor	Tamas Kriska	414-581-3623
Webmaster	Robert Burgess	920-559-7472

Board of Directors

Robert Burgess	920-559-7472
Russell Chabot	414-881-3822
John Hammetter	414-519-1958
Gene Hanson	262-354-0138
Lee Keith	414-425-2331
Agnes Keszler	414-581-7031
Tamas Kriska	414-581-3623
Dennis Roscoe	608-206-0909
Michael Smiley	262-825-3981
Sue Timlin	414-460-4886
Dan Yanko	262-255-3482

April/May Keyholders

4/18	Paul Borchardt	262-781-0169
4/25	Gene Hanson	262-354-0138
5/2	Scott Jamieson	262-592-3049
5/9	Jill Roberts	414-587-9422
5/16	Tim Hoff	262-662-2212
5/23	Lee Keith	414-425-2331