



The Warren Astronomical Society Paper

P.O. Box 1505

Warren, Michigan 48090-1505

www.boonhill.net/was

Volume 36, Number 5 //

2004 WAS OFFICERS

\\ May 2004

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1st VP (program chairperson)
2nd VP (observatory chairperson)
Secretary
Treasurer

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The WASP (*Warren Astronomical Society Paper*) is the official monthly publication of the Society. Each new issue of the WASP is mailed to each member and/or available online www.boonhill.net/was. Requests by other Astronomy clubs to receive the WASP, and all other correspondence should be addressed to the editor, Cliff Jones, email: cliffordj@ameritech.net

Articles for inclusion in the WASP are strongly encouraged and should be submitted to the editor on or before the first of each month. Any format of submission is accepted, however the easiest forms for this editor to use are plain text files. Most popular graphics formats are acceptable. Materials can be submitted either in printed form in person or via US Mail, or preferably, electronically via direct modem connection or email to the editor.

Disclaimer: The articles presented herein represent the opinions of the authors and are not necessarily the opinions of the WASP or the editor. The WASP reserves the right to deny publication of any submission.



Astro Chatter

by Larry Kalinowski

Thanks to Bill Koren and Paul Strong, the members that attended the Macomb meeting, in April, were treated to the demonstration they've been waiting for, for over two years. In the physics lab next door, Bill and Paul performed the speed of light experiment. Very similar to the Michaelson setup in the late 1800's, you could see and hear the spinning mirror and watch the laser beam reposition itself on a video screen as the spinning mirror reflected the beam back to the source. Bill's well given lecture, that explained how the measurements were made, made the demo seem quite simple. To top it off, the measurements revealed about a one percent error. Quite accurate for a lab setup, considering that the laser beam was restricted to a travel length of about forty feet in one direction. The results were about 300,000 kilometers per second. Many thanks and a tip of the LFK hat to Bill and Paul.

The GLAAC (Great Lakes Amateur Astronomy Clubs) group has announced who the speakers will be for the Kensington Metro-Park "Astronomy On The Beach" star party on May 21 and 22. Friday evening the speaker will be Astronaut Tony England, from NASA and Saturday's speaker will be Dr. Patricia Santy, also from NASA. She is a crew surgeon for the astronauts. The main featured astronomical object, on both days, will be Comet Neat, along with Jupiter, Saturn, Venus, Mars and Mercury. The comet will be projected on a large screen so that many can see it all at once in the viewing area, just as Mars was projected, last year, during its close approach to Earth. The speakers will be there, talking, rain or shine, under the protective canopy of the pavilion at The Martindale Beach site. Hot food and drinks will be sold at the usual park prices. The usual park entrance fee may be charged, however, it never has been, in the past. The last few years have drawn over a thousand people each night, with the highest total attendance occurring last year, nearing 5,000 each night. Mars was the

crowd draw last year. Whether a comet will bring as many people out this time, we shall see.

Norman Dillard called me and asked for some background information about Comet Neat 2001 Q4 and I thought it might be a good idea to pass along that info to our WASP readers. The comet was discovered in the year 2001 by the asteroid searching team, Near Earth Asteroid Tracking, hence the acronym "NEAT". It was so far away from Earth at that time that they realized it would take almost three years to approach the Sun and the Earth. The comet will finally make closest approach to the Sun on May 15, this year. Closest approach to the Earth will occur during the first week in May. Q4 means it was the fourth comet discovered in the first half of the month of September, 2001. Each month is divided into two halves with January containing A and B. September contains Q and R. How bright will it be? Hopefully, around first magnitude, bright enough for naked eye viewing and a spectacular sight in binoculars. Will comet Linear 2002 T7, the other comet due to reach the Sun, be as appealing? The answer is yes, if you don't mind viewing it in the early morning sky before twilight in early May. It'll be the first time two bright comets will be seen at the same time, even though they will be in opposite parts of the viewing sky during their brightest displays. During the last half of May, both will be seen in the evening but, by then, their brilliance will be diminished. This is going to shake up some purveyors of doom, because such phenomenon make some religious, astrological and superstitious groups quake in their shoes. For us, the surveyors of the sky, it will be a chance of a lifetime to tell our grand children about. Comet Neat will make the most impressive sight because it'll be an evening comet, when most people will have the chance to see it. Get ready for some great stargazing this month. A map, showing the positions of both comets, during the month of May, can be found on pages 59 and 60, in the May issue of Sky And Telescope.

Speakers for the month of May will be Mike Best and Vince Chrisman. Mike, one of Michigan's prominent astronomical speakers, has been giving lectures for the last thirty-five years or more. He is a retired Detroit News reporter and the founder of the Livonia Astronomical Society. Associated with Schoolcraft college and The Volbrect Planetarium, he has given hundreds of lectures about astronomy, UFO's, and other sky related phenomenon. Mike will be talking about Carl Sagan's quest in life, a program called SETI. It's an acronym for the program the Search for Extra

Terrestrial Intelligence. Mike's presentation will be at Cranbrook on May 3rd. Vince, a member of the club and a previous speaker concerning the Vatican observatories, will be talking about Radio astronomy. His talk will be at MCCC on May 20th. Radio astronomy seems to be an abstract method of imaging objects in the sky. If you've ever wondered what the advantage of radio astronomy was over optical, this talk might provide the answer.

Sedna, the new celestial body, recently discovered, made more news because of its slow rotation. It seems to be rotating in a 20 or 40 day time period. The upper estimate of its diameter has been reduced to 1,000 miles. There is much difficulty in trying to determine the rate of such a far away body. At first it was thought that a moon may have slowed its rotation but a closer look with the Hubble telescope didn't show a moon. More observations will be made, of course, to see if any possible moon may have been missed for some reason.

Bill Beers has announced The Third Annual Cadillac West Spring Star Party. It occurs the weekend before the GLAAC Kensington Star Party, May 13 through 16, Thursday through Sunday. Bill's dark site is located 14 miles west of Cadillac, Michigan, at their cabin. You must RSVP for a map. Limited floor space is available in the cabin, as well as plenty of space for tents and campers. Three motels are available: Gartlets Motel, 231-862-3500, five miles west; Hillside Inn, 231-862-3723, one mile east and Caberfae Peaks, 231-862-3300, one mile east. For more information, contact Bill at 586-566-8367 or e-mail him at beezoll@aol.com. There will be a "Find Pluto" event to spur observing and two comets to wet your appetite, so don't forget your telescope and your camera.

I've been showing up at Steve Greene's house, watching Steve and Bill Beers modify the strut blocks on the twenty-two inch telescope. When the 'scope is transported to an observing site, it has to be disassembled and reassembled at the site. The struts are placed in position first, before the upper cage, with secondary, can be mounted at the top of the struts. The blocks holding the struts were modified by hand some time ago, positioned and permanently mounted in place. As it turned out, the modifications to the blocks weren't accurate enough, causing misalignment of the upper cage each time it was assembled. One strut was misaligned at the top by three inches, making reassembly difficult. This meant forcing the struts

into position and recollimating the telescope each time it was reassembled. Well, the minds of Steve and Bill designed a fixture to hold the upper cage in position above the mirror box, so that the cage wouldn't move relative to the mirror box. The result was an eight foot high, two-by-four construction that allowed mounting the blocks to the mirror box so that the strut angles and heights could be measured and repeatedly assembled in the same way. A special fixture was also designed to hold each block in position while the upper surface of the block could be milled flat at any desired angle to match the side of the mirror box. As a result of all this, the reassembly of the telescope should be much easier, now that the struts are very near their proper positions before cage attachment is attempted. A presentation concerning this modification may be made at a future meeting.

We've had more than our share of close approaches recently with asteroids passing closer to Earth and large meteor falls being reported across the world. Is it possible that there may be a large cluster of heavenly bodies approaching our solar system that we've not been able to detect before?

I apologize if you didn't get the message that the March meeting of the computer group had been cancelled. It was a last minute thing and I tried contacting many of you by e-mail. We'll try again this month. The May computer group meeting is scheduled for May 27 (the fourth Thursday of the month) at Gary Gathen's home in Pleasant Ridge. He lives at 21 Elm Park Rd., three blocks south of I-696 and about a half block west of Woodward Ave. Meetings will start at 8:00 pm. You can reach him at 248-543-3366, or me, at 586-776-9720 for any further information.

MINUTES OF MEETINGS

By Bob Watt, secretary

Cranbrook Meeting 04/05/04

Members: 36

Visitors: Michael Foerster, Solar System
Ambassador/Astronomer,
NASA'S Jet Propulsion Lab
John Castiglione & Glenn Latinen
Guest, Maureen Sundick

The meeting was opened by Norman Dillard, first vice president with Officers reports.

Norman Dillard, 1st vice president, went over a full list of speakers.

Jim Shedlowsky, treasurer: There is a new membership list, see Jim for a copy.

Guest Maureen Sundick passed out fliers for the upcoming speaker Brother Guy Consolmagno speaking on "Adventures of a Vatican meteorite curator". Saturday May 15, 2004, 6:00PM, book signing, Viewing Mineral Hall, Dinner/ Talk \$35.00, 7:30PM Talk, \$15.00. Call or e-mail Maureen for reservations at (248) 538-0423, Msundick@aol.com. Presented by: Michigan Mineralogical Society

The program tonight is "Plate Tectonics" by John Zawiskie, geologist, Cranbrook Institute Of Science.

Program ended at 10:00PM

MINUTES OF MEETINGS

By Bob Watt, secretary

Cranbrook Meeting 04/15/2004

Meeting started at 7:25PM

Members present 27

Visitors Bob Berta

President Ken Bertin opened with officers reports
1st Vice President Norman Dillard, the club has a full lineup of speakers till 2005.

Treasurer Jim Shedlowsky, all is well in the club funds.

2nd Vice President Riyad Matti, there will be a star party for scouts on May 22. the Begineers Group meets at Stargate.

The board met in the hour before the meeting, in attendance were Ken Bertin, Norman Dillard, Jim Shedlowsky & Bob Watt

Sub Groups, Norman Dillard went over the Kensington Star Party.

Librarian Steve Uitti, the astronomical set of 8 VHS tapes are back ready for take out.

Lee Hartwell gave a talk on the "Night Sky Network". He Has 6 programs.

The Break was at 8:50PM

This evenings program was put on by Paul Strong & Bill Koren, a demonstration on how to figure the speed of light. A very interesting & informative program.

The meeting ended at 10:10PM

THE SWAPSHOP



This column is for those who are interested in buying, trading or selling items. Call 586-766-9720 (cometman@mybluelight.com) if you want to put an item for sale or trade in this section of the WASP. The ad will run for six months. The month and year, the ad will be removed, is also shown.

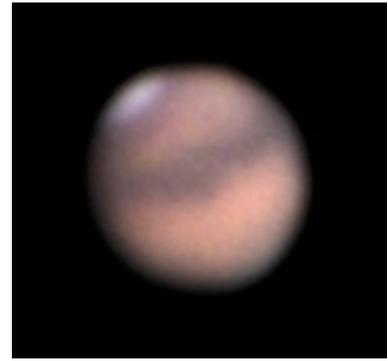
FOR SALE. ETX90, with goto feature, in excellent condition, hardly used. I want a bigger telescope. Norman Dillard. Work phone: 248-546-1480 Cell phone: 248-765-4815. (10-04).

FOR SALE. Celestron, 8 in. Schmidt Cassagrain, 9 volt electric drive, PEC (periodic error correction), four speed quartz drive, heavy duty aluminum adjustable tripod, enhanced coatings and carrying trunk. Best offer over \$669. Mike Best, starmikebest@aol.com. (8-04).

FOR SALE. Classic 6 in. Criterion RV-6 Dynascope., Newtonian reflector, 110v AC electric drive, aluminum pier with three feet, 6x30 two ring finder and rotating tube. Best offer over \$359. starmikebest@aol.com (8-04).

FOR SALE. Refractor, 3 in., metal tube, 1 1/2 in. two ring finder scope, 2 in. tracking erecting eyepiece telescope, Eastman Kodak Aero-Ektar 7.12 in. (178mm) f.l., 5x5, F2.5 camera #EM6294 (\$150 estimated value), AC heated dew shield for the 2 in. tracking scope, wood, heavy duty, surveyors tripod, two fitted wooden cases, two boxes of machine equipment tools for telescope construction. No mount. Best offer over \$439. starmikebest@aol.com. (8-04).

WANTED. NIMH battery for An IBM Thinkpad, model 702C. New or used. Needed for WAS portable computer. Contact Jim Shedlowski, jimskeebros@cs.com. (10-04).



Mars by Riyad Matti 8/10/2003

Telescope: 12.5" f/16 Cassegrain at Stargate Observatory
Camera: Sony FD88
Software: Registax v 1.1

May Calendar

Friday, April 2

- 2:00 pm: The Moon passes 3° north of Jupiter

Monday, April 5

- 7:03 am: Full Moon

Wednesday, April 7

- 1:00 am: Mars passes 7° north of Aldebaran
- 10:25 pm: The Moon is at perigee(226.519 miles from earth)

Sunday, April 11

- 11:46 pm: Last Quarter Moon

Wednesday, April 14

- 12:00 am: The Moon passes 5° south of Uranus

Friday, April 16

- 6:00 am: Venus passes 10° north of Aldebaran
- 9:00 pm: Mercury is in inferior conjunction

Monday, April 19

- Partial Solar Eclipse
- 9:21 am: New Moon

Thursday, April 22

- 2:00 am: Lyrid meteor shower

Friday, April 23

- 6:00 am: The Moon passes 1.5° south of Venus
- 5:00 pm: The Moon passes 2° north of Mars
- 8:25 pm: The moon is at apogee (251,906 miles from Earth)

Sunday, April 25

- 2:00 pm: The Moon passes 5° north of Saturn

Tuesday, April 27

- 1:32 pm: The First Quarter Moon

Thursday, April 29

- 10:00 pm: The Moon passes 4° north of Jupiter

Calendar courtesy of Jim Mills – Check out his web site at: <http://www.njnightsky.com>.

Scheduled Speakers 2004

DATE	DAY	PRESENTER	SUBJECT
5/3/2004	MON	Mike Best	S.E.T.I.
5/20/2004	THU	Vince Chrisman	Radio Astronomy
6/7/2004	MON	Jim Shedlowsky	Iridium Flares
6/17/2004	THU	Ken Bertin Larry K.	Transit of Venus Name that Nebula
7/5/2004	MON	Alan Rothenberg Jim Ehlers	Albion Observatory Restoration
7/15/2004	THU	Alan Kaplan	Globular Clusters
8/2/2004	MON	Riyad Matti	TBA
8/19/2004	THU	Gary Ross	Will Thompson Hay
9/13/2004	MON	Phil Martin	Quantum Mechanics
9/16/2004	THU	Ed Starback	Pluto
10/4/2004	MON	Tom Hagen	McMath-Hulbert Observatory
10/21/2004	THU	Steve Uitti	CUSKY
11/1/2004	MON	Planetarium	Cranbrook Sky Show
11/18/2004	THU	Dave D'Onofrio	Processing CD Images
12/6/2004	MON	Richard Szumanski	Meteors/Comets/ Deep Sky
12/16/2004	THU	Fred Espenak- NASA	Eclipses

Curved Collectors

By Vince Chrisman

This is the very first of hopefully many more monthly columns to come. The name is derived from the mirrors in a reflecting telescope that concentrate and focus the incoming light. Our society provides the members with the ability share ideas that improve our personal knowledge of astronomy and related sciences. This column will concentrate some of that information and bring it into focus for all of us to share.

On Saturday evening, April 17th I arranged to meet Riyad Matti our 2nd VP – Observatory Chairman at our wonderful Stargate Observatory. I wanted to borrow the electronic eyepiece for the upcoming Astronomy Day. The evening air was very still and we were blessed to have clear dark skies, which prompted us to open the dome and begin viewing the planets and other celestial objects.

While viewing the planets we had two gentlemen stop by. One was from Royal Oak and he is very interested in joining the society. The other was a one-time member wishing to join again. Venus, Jupiter and Saturn were stunning. Attempting to improve the visualization I asked Riyad if we have any color filters. This is where the sharing of knowledge is gathered, concentrated and focused.

Riyad has been using a free sample book of Roscolux filters. This book contains a very large selection of filters along with reference charts that describes the filters overall light transmission and charts the spectral energy distribution. Using the small book, you pick the filter you wish to use and hold it between your eye and the eyepiece. Quickly I could go through a number of filters and each one brought out different cloud features of Jupiter. Best of all, this is a free solution of over 100 different filters!

The next day I went online to locate the “free” swatchbook. Searching many Internet sites I found some charge a small amount (\$2.50) while others were higher. One company, McManus Enterprises (<http://www.mcmanuserprises.com>) offered a selection for free including shipping. I selected the Roscolux, Rosco Cinegel, GamColor , and GamColor CineFilters swatchbooks. In a short four days, they arrived in the mail. I now have a very large collection of color filers ranging the visual spectrum.

When you get together with others to enjoy our hobby, this willingness to exchange and share information helps us all grow by collecting and concentrating knowledge into sharp focus.

Clear dark skies with good observations.

UPCOMING WAS EVENTS

May	Mon 3	7:30 pm	Cranbrook Meeting
May	Thurs 20	7:30 pm	Macomb Meeting
	Fri 21	Evening	Kensington Metro Park
	Sat 22	“	Astronomy on the Beach
Jun	Mon 7	7:30 pm	Cranbrook Meeting
	Thurs 17	7:30 pm	Macomb Meeting
Jul	Mon 5	7:30 pm	Cranbrook Meeting
	Thurs 15	7:30 pm	Macomb Meeting
Aug	Mon 2	7:30 pm	Cranbrook Meeting
	Thurs 19	7:30 pm	Macomb Meeting
Sep	Mon 6	7:30 pm	Cranbrook Meeting
	Thurs 16	7:30 pm	Macomb Meeting
Oct	Mon 4	7:30 pm	Cranbrook Meeting
	Thurs 21	7:30 pm	Macomb Meeting
Nov	Mon 1	7:30 pm	Cranbrook Meeting
	Thurs 18	7:30 pm	Macomb Meeting
Dec	Mon 6	7:30 pm	Cranbrook Meeting
	Thurs 16	7:30 pm	Holiday Awards Banquet

We are close to having a Riders, Livonia ad in our WASP publication. As soon as I get the template with their logo and featured items of the month I'll include it.

I would like to see more members articles printed in the WASP. Contributions any one! How about a members profile, how you became involved in Astronomy and the WAS under the “Meet a Member” column.

There is always a space or two between articles for members original work. How about some original astro-jokes, or a brief impression of a sighting. I would also like to use member's photos – there are some great ones out there – but I don't know where to locate them, nor do I won't print them without your permission.

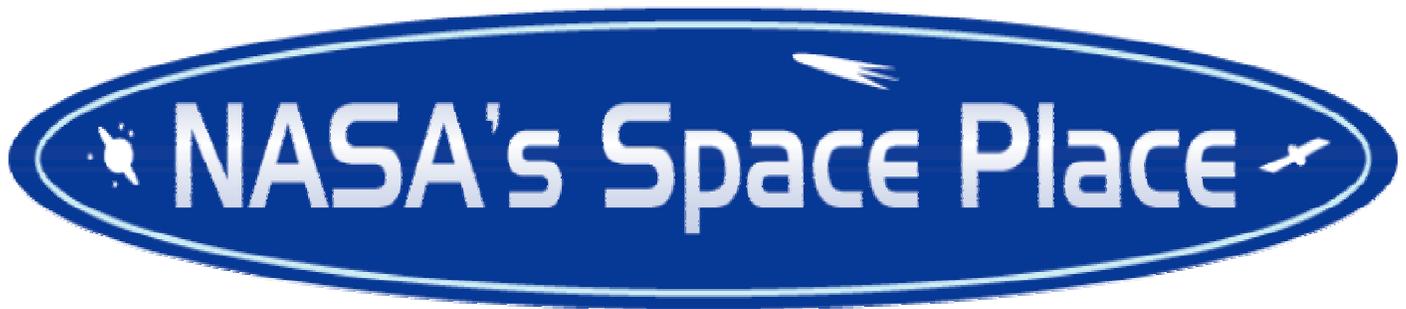
Cliff



Astronomy Day

Editor's Notes

This month Vince Chrisman contributed the article, “Curved Collectors” as well as reworking our membership application and club flyer and fact sheet. I've included them in this issue.



Article Compliments of Nancy Leon of JPL/NASA

Voyage to a Double Planet

By Patrick L. Barry and Dr. Tony Phillips

Download a "nine planets" screensaver for your computer with spectacular photos of our solar system, and you'll notice that one planet is conspicuously missing: Pluto. Icy and mysterious, Pluto is the only planet never visited and photographed by NASA space probes.

In fact, the clearest image we have of Pluto is a tiny, pixelated blob of light and dark patches taken by the Hubble Space Telescope in 1994. It's tantalizing but not much more. Earth-based telescopes have succeeded, however, in discovering one amazing fact: Pluto is not a lone world, but a double-planet system. Its companion, measuring about half the size of Pluto itself, is named Charon.

Work is underway to launch a robotic probe to visit and photograph Pluto and Charon. The project, called New Horizons, will map both worlds. Sensors will chart surface minerals and ices, and catalog the gases that make up Pluto's wispy atmosphere.

"It's the second epoch in the exploration of the planets," says Alan Stern, the principal investigator for New Horizons at the Southwest Research Institute in Colorado. "We're going to the very edge of the solar system."

The probe is scheduled to launch in January 2006. Its journey will be a long one. Pluto is more than 30 times further away from the Sun than Earth is! Even with a speed boost from a flyby of Jupiter, the probe won't arrive at Pluto until July 2015. Afterward, the probe will venture on to explore the Kuiper Belt, a distant "halo" of small, frozen objects surrounding the solar system, from which comets originate.

Aside from sheer curiosity about these distant worlds, scientists are motivated by questions about the formation of the solar system. Orbiting in the deep freeze far from the sun, Pluto and Charon have undergone less change than the inner planets during the solar system's 4.5 billion year history. These two worlds will provide a glimpse into the past.

Pluto could also shed light on the origin of our own Moon. Earth, with its single, large moon, is unusual. The Pluto-Charon system is the only other pair like it in the solar system. In fact, some astronomers consider Earth and the Moon to be a double planet, too. So knowing more about Pluto and Charon could give clues about how the Earth-Moon system formed.

And, of course, the spectacular, up-close photos of Pluto and Charon are going to look great as a screensaver!

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.



Artist's idea of the New Horizons spacecraft flying by Pluto and its moon, Charon. (Credit: Dan Durda.)



WARREN ASTRONOMICAL SOCIETY

WARREN ASTRONOMICAL SOCIETY –Since 1961

The Warren Astronomical Society serving science and southeastern Michigan since 1961 is a non-profit, membership supported, volunteer run, public service corporation dedicated to advancing the study of astronomy, space exploration & technology, and related sciences through information, participation, and inspiration, via research, lectures and presentations, publications, field trips, tours, and public & youth astronomy outreach.

Membership is composed of people from all walks of life who share a common interest in astronomy and science. Some are just starting out while many have built their own telescopes. Some are involved in school and civic activities. Some conduct research for professional organizations, while others just enjoy the fellowship and wonderment of a night under the stars. Whatever a member's interests, all share a common fascination for the mysteries of our universe and a willingness to exchange and share the results of practical observational experience.

Meetings are informal and feature a lecture, usually by a club member. Other agenda items may include recent astronomical news, observations or other astronomy-related features. There is time to socialize with others; to discuss society plans, to participate in the talk, and to share exciting astronomical news with the membership. Why not consider joining the fun?

STARGATE OBSERVATORY

Stargate Observatory is owned and operated by the society. Located on the grounds of Camp Rotary on 29 Mile Road, 1.8 miles east of Romeo Plank Road. The observatory features a 12.5 inch f/17 club-built cassegrain telescope under a steel dome. The dob shed features a club-built 22" truss dobsonian telescope, plus many other telescopes. Stargate Observatory is open to all club members. Open houses for the public are scheduled throughout the year.



MEETINGS

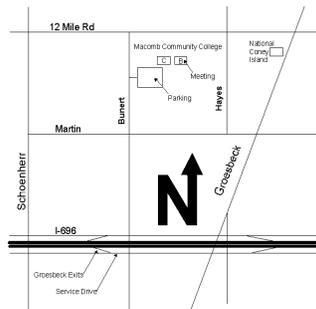
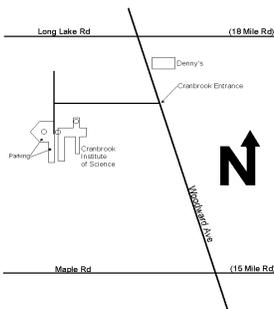
The society holds meetings on the first Monday and the third Thursday of each month, starting at 7:30 pm.

First Monday Meeting

Cranbrook Institute of Science
39221 Woodward Avenue
Bloomfield Hills, MI 48303-0801

Third Thursday Meeting

Macomb Community College
South Campus, Building B, Rm 209
14500 Twelve Mile Road
Warren, Michigan 48088-3896



WARREN ASTRONOMICAL SOCIETY

P.O. Box 1505
Warren, Michigan 48090-1505

www.warrenastronomicalsociety.org

HIGHLIGHTS

- Low membership cost.
- Use of the Stargate Observatory.
- Monthly publication of the Warren Astronomical Society Paper (WASP).
- Variety of special interest subgroups.
- Library of astronomy related books, periodicals and videos/DVDs.
- Astronomical computer shareware library.
- Free use of club loaner telescopes.
- Astronomy magazine discounts.
- Cranbrook Planetarium demonstration.
- Awards banquet.
- Star parties.
- National Astronomy Day.

WARREN ASTRONOMICAL SOCIETY



MEMBERSHIP/RENEWAL APPLICATION

New Member

Renewal

Name: _____ Date: _____

Address: _____

City: _____ State: _____ Zip: _____

Home Phone:(____) _____ Cell Phone:(____) _____ Work Phone:(____) _____

E-mail address: _____

I would like to take advantage of the online color version in .PDF format of the **Warren Astronomical Society Paper (WASP)**, so don't send me a paper copy. (You will be notified by e-mail when your color newsletter is ready for download.)

May we send you monthly updates and occasional information on WAS activities by e-mail? YES NO

MEMBERSHIP DUES:

Regular Membership: \$30

Additional Family Membership: (Immediate family of regular member, residing at same address)

Names: _____ (\$7 for all) \$7

Sr. Citizen: (One person 65 years of age or older) \$22

College Student: (One person attending College or University) \$22

Student Membership: (Individual students, through High School) \$17

Magazine Subscription and Renewals: (At special WAS annual discount rates)

Astronomy (1 year, 12 issues at \$29.00) New Renewal \$29.00

Sky & Telescope (1 year, 12 issues at \$32.95) New Renewal \$32.95

TOTAL AMOUNT: (Please provide a single check payable to **Warren Astronomical Society**) Thank you! \$

OPTIONAL INFORMATION:

Where did you hear of our Society? _____

Experience level:

Beginner Intermediate Advance Professional

Telescope(s):

New/Dobsonian New/Equatorial Refractor SCT Radio
Binoculars Other: _____

Make/Model: _____

Aperture: _____ Inches Millimeters f/Ratio: _____

Area(s) of interest:

Beginner Deep Sky Variable Stars
Lunar and Planetary Meteor Observing Comets and Comet Hunting
Solar Computer Radio Astronomy
Astrophotography (Film, Video or CCD) Field Trips Public and Youth Astronomy Outreach

Send completed application with your check to:

Warren Astronomical Society Membership, P.O. Box 1505, Warren Michigan 48090-1505

WARREN ASTRONOMICAL SOCIETY
P.O. BOX 1505
WARREN MICHIGAN 48090- 1505



TO:

The society holds meetings on the first Monday and the third Thursday of each month, starting at 7:30 pm.

First Monday meeting:

Cranbrook Institute of Science
1221 North Woodward Avenue
Bloomfield Hills, Michigan

Third Thursday meeting:

Macomb Community College
South Campus, Bldg B, Room 209
14500 Twelve Mile Rd
Warren, Michigan