



## The Warren Astronomical Society Paper

P.O. Box 1505

Warren, Michigan 48090-1505

[www.boonhill.net/was](http://www.boonhill.net/was)

Volume 36, Number 12 //

### 2004 WAS OFFICERS

\\ December 2004

President  
 1<sup>st</sup> VP (program chairperson)  
 2<sup>nd</sup> VP (observatory chairperson)  
 Secretary  
 Treasurer

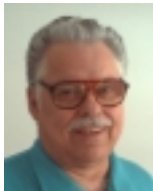
Ken Bertin  
 Norm Dillard  
 Riyad Matti  
 Bob Watt  
 Jim Shedlowsky

email: [szygie@aol.com](mailto:szygie@aol.com)  
 email: [jupiter1927@aol.com](mailto:jupiter1927@aol.com)  
 email: [riyadmatti@yahoo.com](mailto:riyadmatti@yahoo.com)  
 email: [rdwatt@comcast.net](mailto:rdwatt@comcast.net)  
 email: [jimskeebros@cs.com](mailto:jimskeebros@cs.com)

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](http://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](mailto: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 WAS or the editor. The WASP reserves the right to deny publication of any submission.

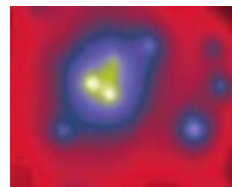


## Astro Chatter

by Larry Kalinowski

It's banquet time again. You know, the time when all the hard working members of the club get some kind of recognition and the rest of us get to have a really good time indulging in food and spirits, as well as meeting some past members that you haven't seen in a long time. You might even get a chance to take home a raffle prize of some kind, ranging from books and software to telescope hardware, like eyepieces or filters. Yes, it's our annual holiday awards banquet. The place is DeCarlo's on Ten Mile Rd. , just east of Mound Road. The featured speaker will be NASA employee Fred Espenak on eclipse astronomy and the price is \$23 per person. And guess what? Wives are invited to attend too! Social hour begins at 6:30. Food is served at 8:00 PM. That's Thursday, December 16, It replaces our regular MCCC meeting. If you have a program or piece of hardware that's related to astronomy or observing and you'd like to donate it to the raffle, bring it along that evening. See you there!

The December Cranbrook meeting features Richard Szumanski. He'll be talking about Meteors, comets and deep sky objects.

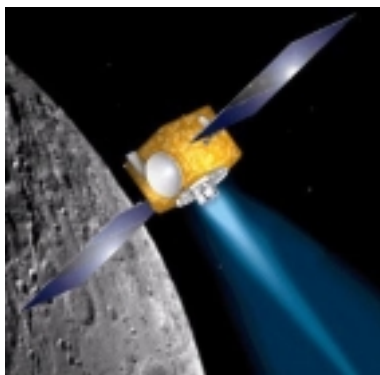


Our own galaxy, the Milky Way, seems to have another black hole near its center. It's not too far away from the first black hole that was discovered in it. Several massive stars are orbiting the hole and those stars helped calculate its mass. The new hole is somewhere in the range of an intermediate sized hole. Black holes are now believed to come in at least three sizes, large, medium and small. The new hole has been designated GCIRS 13E.

Northern lights filled the sky on Sunday, November 7. It's the first time in a long time that I was able to see streamers all the way to the zenith and even further south, in Roseville, near Twelve Mi. Rd. and Gratiot. Intense reds were visible farther north and word spread like wildfire after an announcement on television.

You'll get another chance to see Jupiter occulted by the Moon on December 7th. This time it'll be during the darkened sky of mid morning, instead of the bright, afternoon sky. The pair should be visible about 15 degrees above the eastern horizon when the occultation begins. Quite high enough for observers in the Detroit metro area. Occultation time will be about 3:50 AM, EST. What's even more interesting is, the darkened sky reveals Jupiter's moons, giving a grand show of disappearing bodies, into the lighted limb of the Moon. Like last month's occultation, give Jupiter about a minute to disappear, an hour or so to move behind the Moon and reappear, taking another minute to slip into visibility again.

By the time you read this, the Moon will have another object orbiting around it and the propulsion system is something to talk about. It's an ion propelled engine that uses charged particles to move the satellite into space. Named Smart-1 by the European Space Agency and launched last September, it finally has achieved a lunar orbit after circling the Earth numerous times, in an ever expanding push to the Moon. Ion propulsion engines have a very small thrust but can apply that thrust over longer periods of time because of the engines high efficiency. Out of 181 pounds of fuel on board, only 130 pounds were used up. After performing some experiments to look for water ice at the poles, the craft will be destroyed after crashing into the Moon's surface. An artist's conception of the probe in orbit around the Moon is seen below.



The October lunar eclipse turned out better than expected. I ventured out to our observatory sight on 29 Mile Rd and found the clouds just beginning to dissipate. By the time the Moon entered the umbra

of the Earth's shadow, the sky had cleared and all phases of the eclipse were visible. About thirty people were at the sight, which included three or four that were camping on the grounds. The Moon appeared darker than the last eclipse, but that was expected because it moved closer to the center of the shadow this time.

Marty Kunz reported that Cranbrook had good skies during the eclipse and attendance reached about 50 over the nights viewing.

New Comet Machholz, C/2004 Q2, is getting closer and priming itself for northern hemisphere observers. The comet will be visible all through December and January with closest approach to the Sun during the last week of January, on the 25th of the month. A telescope or binoculars will be needed. Closest approach to the Earth occurs on January 5, near the star group called the Pleiades. The magnitude is expected to be around 4.0, barely visible with the naked eye under urban sky conditions.

A new Gamma ray observatory has been launched into space. The craft is designed to spot Gamma ray bursts that only last for a few seconds. There are only a few dozen known burst sources. Hopefully this probe will be able to detect and relay back information about a possible 200 or more bursters per year. The probe is called Swift, because of its unique ability to quickly turn its detectors to the bursting object and relay information. Gamma ray bursts are thought to be the birth of black holes. An artist's conception of the probe is shown below.



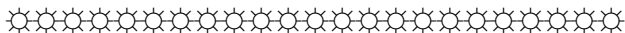
Our constitution has received the OK from the Macomb meeting to add two more members to the board of directors. They will be called Board Members At Large and will handle public relations and overseeing the publication of the WAS newsletter. Marty Kunz will be the just appointed public relations man and Vince Chrisman the just appointed newsletter overseer. They will be officially installed as board members at our next election in October, 2005.

Another air speed record was broken when NASA launched a twelve foot ramjet from a Pegasus rocket off the California coast. After being released from the rocket, the ramjet kicked in to push the small vehicle to 7,000 MPH. That's around ten times the speed of sound. The ramjet vehicle was

not manned and flew under power for about ten seconds before its planned drop into the sea. Ramjets aren't meant to go into space. They must rely on the Oxygen in the atmosphere to burn their fuel, so they are considered the next step in hypersonic flight within our atmosphere. Fast commercial passenger flights are possible between continents and extra long range bombers are considered to be possible developmental candidates. NASA's last attempt, in 2001, reached a speed of nearly 5,000 MPH.

There are hints that Saturn's rings contain more small moons that cannot be seen. Intertwining rings can be found in other parts of the planets rings and many of the rings have very well defined edges, suggesting that a small moon is gathering dust and loose material as it orbits the planet. Some are probably smaller than a football field and difficult to find even with space probes.

The December computer group meeting is scheduled for December 23rd, (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.



## THE SWAPSHOP

This column is for those who are interested in buying, trading or selling items. Call 586-776-9720 ([cometman @my bluelight .com](mailto: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.** Parts to build an 8 in. telescope. Includes an 8 in., F7, Pyrex mirror (1/25 wave, 56.3 in f.l.), finished fiberglass tube, 1.83 in. Pyrex, elliptical diagonal mirror (1/16 wave), Tube cradle, heavy duty brass pillow block bearings mounted in pipe fittings, two wooden disks for making the mirror support and a seventy lb. Steel base with a 2 1/2 in. flange, threaded for a 2 1/2 in. pipe post. 586-754-4076. Asking \$100 for all. (5-05).

**WANTED.** 12 1/2 inch aluminum mirror cell. Call Bob Watt at 586-757-4741. (2-05).

**WANTED.** A 3.1 inch F-15 refractor (tube assembly only) for a photographic guide 'scope. Would prefer a Meade ('80's vintage) or Unitron. Jim Ehlers, 248-628-1615 or e-mail [ehlers71@comcast.net](mailto:ehlers71@comcast.net). (2-05).

**FOR SALE.** Celestron C102 HD, 4 inch , F-9 refractor. Comes complete with star diagonal and 20mm eyepiece (standard issue). Very good condition! Asking \$265. Jim Ehlers, 248-628-1615 or e-mail [ehlers71@comcast.net](mailto:ehlers71@comcast.net). (2-05).

## MIKE SLASHES PRICES IN HALF!

**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. \$200. [starmikebest@comcast.net](mailto:starmikebest@comcast.net). (12-04).

**FOR SALE.** Refractor, 3 in., metal tube, 1 1/2 in. two ring finder scope, Eastman Kodak Aero-Ektar 7.12 in. (178mm) f.l., 5x5, F2.5 camera #EM6294 (\$150 estimated value), No mount. \$237. [Starmikebest@comcast.net](mailto:Starmikebest@comcast.net). (12-04).

**FOR SALE.** Mirror cell for ten inch mirror. Plywood, very light weight. Fits 12in. ID tubes or larger with longer bolts. \$10.00. 586-776-9720. (12-04).

**FOR SALE.** Four vane spider, for diagonal bolts 3/8 in dia. or smaller. Fits 12 1/2 in. ID tubes or larger with longer bolts. \$10.00. 586-776-9720. (12-04).



## Message from our President Ken Bertin

Dear Members:

2004 was a very good year in Astronomy and particularly for the Warren Astronomical Society.

We got to experience the successful Mars Pathfinder mission, with Spirit and Opportunity revealing Mars' secret past. We also got to watch as the Cassini Space probe opened new information about that glorious planet Saturn. Seeing Saturn for the first time through a telescope was what I call the hook which snagged me and many of you into a lifelong passion for Astronomy. We got to see Venus transit the Sun, something no

one alive today on Earth saw the last time around. An event now seen only six times since the telescope was invented in 1609. And of course, we got to see another Lunar Eclipse even though the weather reports were dismal.

From a club perspective this year has been quite fulfilling. We added dozens of members to our roles, reached out to the community with informative programs at Cranbrook and Stargate. We repaired the roof of the observatory, albeit temporarily. We added a computer and several scopes for use by the membership. Our meetings have been fascinating much due to the speakers and their extraordinary presentations.

I would like to give special thanks to our officers. Norm Dillard carried on the tradition of influencing others of their obligation to impart their considerable knowledge through the giving of presentations at our meetings. Riyad Matti applied his expertise in turning Stargate into a showpiece by bringing groups in to learn of observational Astronomy. Jim Shedlowsky took on the job of Treasury with great enthusiasm and is probably going to be the driving force in getting our database in manageable order. Bob Watt who tirelessly works to get matters organized and has made dealing with outside organizations much simpler. I would also like to thank Mary Kunz, for mentoring me through my first year as President. Also Bill Beers who eased the Treasurer transition for Jim. Cliff Jones for his great work on the WASP and Larry Kalinowski's contributions to its success. Vince Chrisman and Dave D'onofrio for their help in developing flyers and other publications to get info out to members and others about our organization. Bryan Klaus for supplying snacks for our meeting breaks. Steve Uitti for ably taking over our Library. And of course to all the members who gave of their time to speak before the group, preparing terrific presentations to ever expand our knowledge of the universe.

I look forward to another year with great enthusiasm, knowing it will have go some to equal the enjoyment I received from being your President in 2004.

Respectfully submitted,

Kenneth M. Bertin



This cartoon from STARIZONA, [www.starizona.com](http://www.starizona.com), features Bob Berta and his wife with a suggestion on moving to Arizona. Welcome to Michigan Bob! You can't leave now that you are going to be the Society's new secretary!



**30991 Five Mile Rd., Livonia, MI 48154  
(734) 425-9720 – Ask for John or Dan**

**Now stocking Vixen telescopes and accessories.**

See the new "**Sphinx**" GoTo Mount with the world's first LCD screen star chart controller. Now taking orders for the new Meade LXD75 telescopes.

For children's fun in space entertainment, try this site: <http://saturn.jpl.nasa.gov/kids/index.cfm>

Submitted by one of our members, Michael O. Best.

Also, check out Mike's web site: [StarMikeBest.com](http://StarMikeBest.com) Mike gives star shows at Vollbrecht Planetarium in Southfield as well as presentations at libraries and for any group, scouts, seniors etc. How about a wedding under the stars, rain or shine at Vollbrecht Planetarium – Call Mike.

The following is a recent list of publications, programs and videos available for loan from the WAS library. Although this list was published in an earlier issue, I felt it would be timely to print it again for winter when the nights are cold, long. Then even the most avid optical astronomer becomes an armchair astronomer.

<u>AUTHOR / GROUP</u>	<u>TITLE</u>	<u>Comment</u>
AAVSO	Manual for visual observing of variable stars	
Abell, George	Exploratoion of the universe	2nd edition - 2 copies
Abell, George	Realm of the universe	3rd edition
Abetti, Giorgio	The Sun	
Ackroyd, Peter	First Light	
ARCO	Out of this World	
Armitage, Angus	William Herschel	
Armitage, Angus	The World of Copernicus	
ARNY	Explorations introduction to astronomy	
Asimov, Issac	The Collapsing Universe	
Baker & Fredrick	An Introduction to astronomy	7th edition
Baker, David	The Larousse guide to astronomy	
Barnett, Lincoln	The Universe & Dr. Einstein	
Beatty , Kelly, & Chaikin	The New Solar System	3rd edition- 2 copies
Beatty, Petersen, Chaikin	The New Solar System	
Beer, Roy, &White	Vistas in Astronomy	Part -1
Begelman Mitchell	Turn right at Orion	
Bennett, Jeffrey	On the Cosmic Horizon	
Bergamini, David	The Universe	1969
Berman, Bob	Secrets of the night sky	
Berry Richard	Telescope Making #41 & # 42	Summer&Fall 1990
Berry Richard	Build Your own Telescope	1985
		2nd edition
Birney, Scott	Modern Astronomy	1994
Bok & Bok	The Milkey Way	1981
Bonano Margaret	Star Trek - Strangers from the sky	
Bonestell Chesley	The conquest of space	
Brandt, J	The International Halley Atlas Watch	
Branley, Franklin	Exploration of the Moon	
Bray R. J.	Sun spots	Gary Walter - donor
Breuer, Reinhard	Contact with the stars	
Brown, Sam	All about Telescopes	
Burnham, Robert	Burnham's celestial handbook	Vol. 1- 2- 3.
Burnham, Robert	Great Comets	
Bylinsky, Gene	Life in Darwins Universe	
Cambridge University	Astronomy	
Chaisson&McMillan	Astronomy a biginners guide	
Chaptman,	The Inner Planets	
Clarke, Arthur	2061 Odyssey Three	
Collins Stewart	The Mariner 6 & 7 pictures of Mars	
Condon, Ed	Scientific study of unidentified flying objects	
Cooke , Donald	The Life & Death of Stars	
Cooper, Henry	A House in Space	
Cooper, Henry	A Night at the Observatory	

Covington Michael	Asrophotography for the Amateur	
DeNevi, Don	To the edge of the Universe	
Dickinson, Terence & Dyer, Alen	The Backyard Astronomers guide	
Enslow & Lutterworth	Deep Sky Observers Handbook	Vol. 1-5
Ferris, Timothy	Coming of the age in the Milky Way	2 Copies Ed Cressman - donor
Filkin, David	Steven Hawkings Universe The Cosmos explained	Advanced Astronomy - Digital
Fjermedal, Grant	New Horizons in Amateur Astronomy	
Freeman, Michael	Space Travellers Handbook	
French, A. P.	Einstein A Centenary Volume	
Gall,	Astronomical Directory	3000 Listings
Garfinkle, Robert	Star Hopping	
Gatland, Kenneth	Space Technology	
Goldsmith, Donald	The Astronomers	
Gray, Jermey	Ideas in Space	
Halliday & Resnick	Fundamentals of Physics	2nd Edition AI Vandemarliere - donor
Halliday & Resnick	Fundamentals of Physics	
Harper,	The Science of Astronomy	
Harris, Sydney	What's so funny about Science	
Harsanyi, Zsolt	The Star Gazer - Galileo	
Hawking, Steven	A brief History of time	
Hawkins, Gerald	Beyond Stonehenge	
Hellier, Cole	Cataclysmic Variable Stars	
Henbest& Marten	The New Astronomy	
Henden & Kaitchuck	Astronomical Photometry	1982
Hey, J. S.	The Evolution of radio Astronomy	
Hill, Harold	A Portfolio of Lunar Drawings	
Hirsch & Trento	The National Aaeronautics & Space Administration	
Hockey,	Book of the moon	
Holt,	An Introduction to astronomy	
Howard, N. E.	Handbook For Observing the Satellites	1958
Howell, Steve	Handbook of CCD Astronomy	
Hoyle, Fred	Frontiers of Astronomy	
Ingalls, Albert	Amateur telescope making	
Ingalls, Albert	Amateur telescope making	Advanced
Jastrow, Robert	Red Giants & White Dwarfs	Roger Sivic - donor
Joles, Mark	The Mars one crew manual	Mike O'dowd - donor
Jones, Ser Harold Spencer	Life on other worlds	
Kirby & Smith	U. S. Observatories	
Klein, Miles	Optics	
Knight, David	Eavesdropping on Space	Riyad Matti - donor
Knollwood books	Catalogue's of books	
Kronk, Gary	A descriptive catalog	1984 & 1988 Tom Mc Laney - donor
Levy, David	Observing Variable Stars	
Lewis, Richard	From Vinland to Mars	
Ley ,Willy	Watchers of the skys	
Ley, Willy	Mariner IV To Mars	
Liller & Mayer	The Cambridge Astronomy guide	

Mallas & Kreimer	The Messier Album		
Maloney, Terry	Stars, Suns, Planets		
McAleer, Neal	The Mind boggling Universe	Mike O'dowd	
Meadows, A. J.	Stellar Evolution		
Menzel	Astronomy		
Misner	Gravitation		
Mitton	Astronomy an intro. For amateur		
Moore, Patrick	The Amateur Astronomer's glossary	1967 Roger Sivic	
Moore, Patrick	1973 Year book on Astronomy		
Moore, Patrick	Life on Mars		
Moore, Patrick	The Picture History of Astronomy		
Moore, Patrick	The Story of Astronomy		
Muirden, James	How to use an Astronomical Telescope	2 Copies	
Murdin, Paul	Catalogue of the Universe	2 Copies Roger Sivic	
Murray, Bruce	Earthlike Planets		
Murray, Bruce	The Planets		
NASA	Neptune Science Summary	1989	
NASA	Skylab Experiments	Vol. 2	1973
NASA	Riddles of the Rings		
NASA	Space Camp Application Book		
NASA	The Soviet- American Conference on Cosmochemistry of the Moon & Planets	Part I	
NASA	The Soviet- American Conference on Cosmochemistry of the Moon & Planets	Part II	
NASA	Apollo Over the Moon: A View from Orbit	Ken Kelly - donor	
NASA	Solar System Exploration Committee ( Planetary Exploration thru 2000 - an augmented program )	Mike O'Dowd - donor	
NASA	Space Resources for Teacher - Chemistry		
NASA	First men on Moon		
NASA	Space Resources for Teacher - Biology		
NASA	Surveyor III Preliminary Report		
NASA	Images of Mars		
NASA	Planet & Space Science - January 1992		
National Commission on Space	Pioneering The Space Frontier	2 copies Mike O'Dowd - donor	
Pasachoff, Jay	Contemporary Astronomy	2nd & 4th edition	
Pasachoff, Jay	Astronomy From the Earth to the Universe	4th edition	
Pasachoff, Jay	Stars and Planets		
Pergamon Press	Planetary and space science		
Petersen & Brandt	Hubble Vision		
Poynter, Margaret	Voyager The story of a space mission	Mike O'Dowd - donor	
Preston, Richard	First Light		
Ray, H. A.	The Stars	1970	
RCA	Photomultiplier Manual		
Ridpath, Ian	The Encyclopedia of Astronomy & Space		
Ridpath, Ian	The Night Sky		
Riemer, Marvin	The Telescope & The World of Astronomy		
Robbins, Jefferys	Discovering Astronomy		
Robertson & Muirden	Astronomy Data Book		
Roth, Gunter	The System of minor planets	Ken Kelly - donor 1962	
Rowan & Robinson	Cosmology		
Ruchlis, Hy	Orbit A picture story of force & motion		

Sagen Carl	The dragons of eden	
Schulke, Flip	Your future in space	Ken Storm- donor
Schwarzschild, Martin	Structure & evolution of the stars	Donald G. Lemons - donor
Scientific American	The new Astronomy	
Sherrod, Clay	A complete manual of amateur Astronomy	
Shields, John	Introduction to radio Astronomy	
Sidgwick, J. B.	Observational Astronomy for amateurs	Roger Sivic - donor
Sparke and Gallagher	Galaxies in the Universe	Advanced Astronomy
Sullivan, Walter	We are not alone	Roger Sivic - donor
Texereau, Jean	How to make a tetlescope	#2 #3 #4 #5
Thompson, Allyn	Making your own telescope	3 copies
TMM	Telescope Making Magazine	#2 #3 #4 #5
Tucker, Wallace & Karen	The cosmic inquirers	3 copies
U. S. Government	The American Ephemeris	
Wallis & Provin	A manual of advanced celestial photography	
Washburn, Mark	Distant encounters-The exploration of Jupiter & Saturn	Ken Kelly-doner 1983
Webb, Rev. T. W.	Celestial objects for common telescopes	vol. 1 & 2 Gary Walter -donor
Weinberg Steven	The first three minutes	vol. 1 & 2 Gary Walter -donor
Weiner, Jonathan	Planet Earth	Clyde Burdette - donor
Wheeler, Craig	Cosmic Catastrophes	
Whipple, F. L.	Larousse Encyclopedia of Astronomy	Clyde Burdette - donor
Whitney, Charles	Whitney's star finder	
Wilkening, Laurel	Comets	
Wilson, Colin	Star seekers	
Wray, James	The color atlas of Galaxies	
Young, Charles	Lessons in Astronomy	
Zadde and Smits	Making friends with stars	
	A brief history of time	
	Above top secret	
	Amateur Astronomy in Detroit	
	Charles Brisley's last camp out with making of stargate	
Warner Brothers	From Earth to the moon	1958
J M I	N G T -18	1993
J M I	Products catalog	1994 edition
NASA	Huston we've got a problem	
NASA	Landing on Mars	
NASA	Apollo 11 The eagle has landed	
	Project Universe	Part 1 & 2 & 8 Allen Rothenberg - doner
Coast Comm.	Cosmos	Part 1 & 2
Sagen, Carl	Spectra of Halley's Comet	
Umanoff, Craig	Seven days in space	
	UFO Sightings , Photographic Evidence	Part - 1 & 2
	U S Space camp Adventure	
A & E	The Planets	
	Return to the Moon	
Softkey	Orbits 3.0	
	MPO Connections Installation guide & Operating instructions	Norman Dillard - doner
Palomar Observatory	Real Sky - Sky Survey	
NASA	Radio Presentation	10 tapes
Stallar 28	Constellation game	

- Astro card set III -The finest double stars
- L F K Astronomical Exposure
- Collimating a Newtonian Telescope
- Getting Started in Astronomy
- International Dark Sky Association
- Professional Amateur Collaboration

### Upcoming Events in 2004

Month	Day	Time	What	Where	Presenter	Subject
December	Mon 6	7:30 pm	<u>Cranbrook Meeting</u>	<u>Cranbrook Institute</u>	Richard Szumanski	Meteors / Comets / Deep Sky
	Thurs 16	7:30 pm	Holiday Awards Banquet		Fred Espenak - NASA	Eclipses

### December 2004 Calendar

**Saturday, Dec 4** • Last Quarter Moon  
**Sunday, Dec 5** • Venus and Mars are about 1.3° this morning and tomorrow  
**Tuesday, Dec 7** • Crescent Moon occults Jupiter in early morning hours.  
**Thursday, Dec 9** • Waning crescent moon 5° south of Mars and 7° south of Venus in compact line in predawn sky  
**Friday, Dec 10** • 3:00 a.m. Mercury is in inferior conjunction  
**Saturday, Dec 11** • 8:29 pm: New Moon  
**Sunday, Dec 12** • 4:27 p.m: The Moon is at perigee (22,441 miles from Earth)  
**Monday, Dec 13** • Geminid meteor shower peaks under favorable conditions; expect 60 to 100 meteors per hour after midnight, into dawn hours of Dec. 14 • noon: Pluto is in conjunction with the sun  
**Wednesday, Dec 15** • The Moon passes 5° south of Neptune, 6:00 a.m.  
**Thursday, Dec 16** • 4:00 p.m. The Moon passes 4° south of Uranus  
**Saturday, Dec 18** • 11:40 a.m. First Quarter Moon  
**Tuesday, Dec 21** • Solstice; winter officially begins at 7:42 a.m. EST  
**Thursday, Dec 23** • 4:00 p.m. Venus passes 6° North of Antares  
**Sunday, Dec 26** • 10:06 a.m. Full Moon  
**Monday, Dec 27** • 2:15 p.m. The Moon is at apogee (252,850 miles from Earth)  
**Tuesday, Dec 28** • 1:00 a.m. The Moon passes 5° north of Saturn • Midnight, Mercury passes 1.2° north of Venus

**Wednesday, Dec 29** • Mercury and Venus are within 1.2° of each other for next two weeks, low in morning sky; Mercury at greatest elongation west of Sun (22°) in dawn sky

\*\*\*\*\*



This new picture of galaxy NGC 6118 caught two interesting sidelights -- an exploded star and a passing satellite. (In this copy I am unable to see the blue streak of the passing satellite, however, the arrow pointing to the supernova is visible. – Cliff)

Credit: ESO/VLT and SPACE.com Staff