

Inside Orbit

February 2007

Volume XXXXIII - Number II

A Publication of the Grand Rapids Amateur Astronomical Association

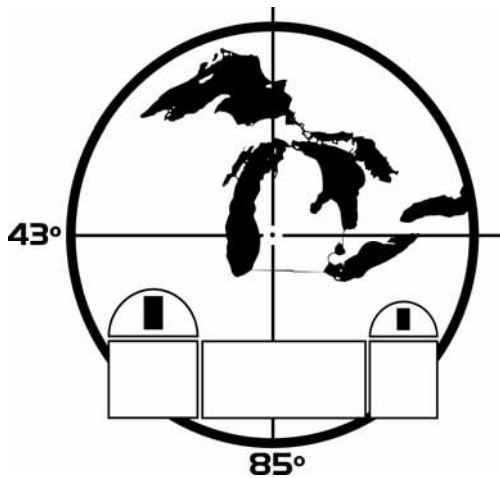


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★★
★ *I'm really fascinated by the way people have been able to discover these, like, orders out of supposed chaos.* ★
★ *I've never been so good at it, myself.* ★
★ *I mean, I still stare at the sun and I say, "Why?" And then I say "Ouch," because, you know, I stared at the Sun too long.* ★

— David St. Hubbins



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Astronomical Association

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Happenings in the GRAAA and the astronomical community

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This is the article for you*

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NASA's Space Place

*The wonders of the world of science and technology, brought to you by
the Jet Propulsion Laboratory*

Roger B. Chaffee Planetarium

Current Sky Shows

Note: Any views and opinions expressed by the authors in this publication are not necessarily those of the GRAAA or its members.

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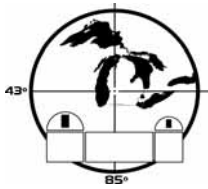
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Image Credit: Comet McNaught over the South
Burnett-Maidenwell Observatory in Australia,
taken January 21, 2007 by Jim Barclay,



2007 - A Year of Change for the GRAAA

by Kevin S. Jung

2007 is going to be a year of changes for the GRAAA. At the January board meeting, the results of the membership survey were discussed. This year we will be attempting to address many of the areas that members have indicated that the club (as a whole) need changed. Of course, there are some things that are beyond our control (individuals' free time, conflicts, etc).

One of the questions from the survey asked about monthly meeting days and times. After everything was totaled up, the majority of membership indicated that the first Saturday of the month would work the best. So, beginning in March, club meetings will be on the first Saturday of the month, at the usual (7.30pm) start time. The only time we will deviate from that is if there are conflicts with holidays or special meetings/events. Case in point: April. We are having a special speaker, so the meeting will be on the third Wednesday.

Changing the meeting dates frees up the third Saturday of the month for monthly star parties for the members. We tried this once last year, but were clouded out. We are currently working on a plan for monthly star parties – if it's clear – during the “warmer” months (March/April through October/November). Sometimes we might change it to Friday nights, so people who can't make any Saturdays have a chance to participate.

All the information will be in the monthly newsletters and online at the website. There will be a “Members Events Calendar” in the Members' Area of the website. It will list the events during the year just for the members of the club – meetings, star parties, board meetings, etc. Look for it soon.

We hope this will give members more of a chance to participate in club events. Like I alluded to before, we can't control people's schedules, but we hope that with such a variety of times and dates available, members can make it out to the Veen more often.

So look for First Saturday Meetings and Third Saturday (and sometimes Friday) Star Parties.

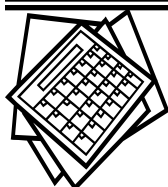
Another change on the horizon for 2007 will be adjustments to Visitors' Nights. The committee responsible for this will be meeting in February to set the yearly schedule, and are looking to change the starting and ending times this year. Instead of a “regular” start time, open nights will start at sunset. This means that for some months, usually in the summer, we may be starting later, but in the fall we could be starting as early as 7.00pm. Please see the March newsletter for the final plan.

The board of directors, after some serious looking at the treasury, has also made the decision to raise membership dues by a small amount, which is reflected on the membership renewal/application forms.

Expenditures have been going up for years now, and in the past few years income has gone down. There has been a diminishing number of totals at visitor nights and, where once you couldn't slew a telescope without hitting a group at the observatory, visits by groups have gone down so much that last year we only had six. Six! When in years before, nearly every available night was taken up with groups, especially in March - May and September/October. What's to blame for the downturn of groups and visitors? Who knows? It could be lack of publicity. It could be lack of anything “spectacular” in the night sky. It could be economic factors.

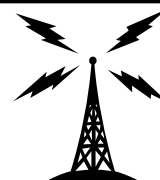
In 2006, we had to repair the road, and repaint the entire observatory. As with all things that get old, things need (nearly) constant repair. This year we are hoping to have the door replaced, and some of the much-needed electrical work done. And even though we do get some things donated, all of these cost money, which is unfortunate.

We hope everyone will continue to support the association. We hope that the changes we are making will make it easier for more members to participate in events and to enjoy the benefits of belonging to the Grand Rapids Amateur Astronomical Association.



News and Events

(Latest News and Events always online
at www.graaa.org)



THERE WILL BE NO GENERAL MEETING IN FEBRUARY, but will resume in March. Check the website for the latest information on this, and all, upcoming meetings.

GRAAA OFFICERS: Congratulations to the newly elected (and some reelected) Officers for 2007:

President: Kevin Jung
Vice-President: Jeff Kozarski
Secretary: Paula Blumm
Treasurer: Jerry Persha

OBSERVATORY: We are going to be doing some electrical work at the observatory this spring, and we are in *real* need of an electrician. If you are an electrician, please contact Ron Vander Werff.

A NEW LEADER EMERGES: Congratulations to Paula Blumm, who was recently appointed Supervisor for Lowell Township, replacing the person who stepped down. We don't think we have to salute her, but who knows. :)

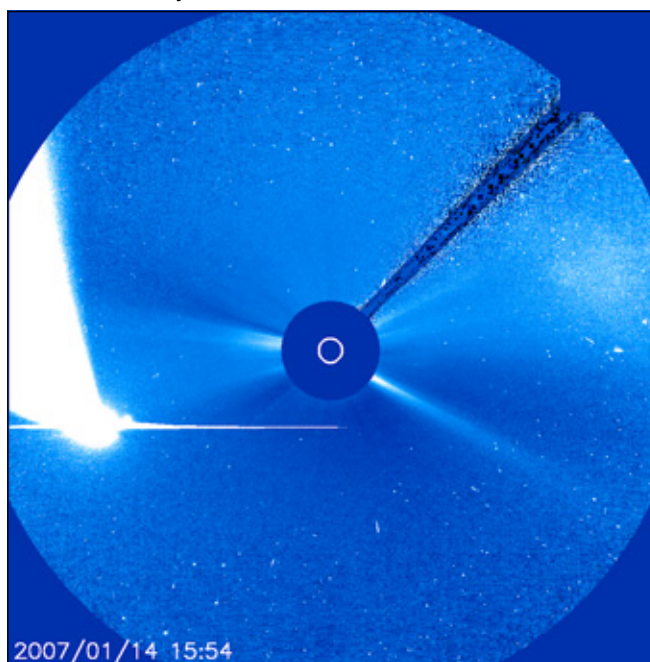
GRANT MONEY: It has come to our attention that companies and businesses regularly give grants to local non-profit groups for worthwhile causes. We would like to ask all association members to inquire at the places of business as to whether their company provides grants for non-profits. With all the things we have planned, it sure would be nice to have some funds to do them with.

MARK THURSDAY, MARCH 29TH ON YOUR CALENDAR: There will be talk by Homer Hickam, the author of *Rocket Boys*, which was the basis of the hit film *October Sky*. His talk will be at the Forest Hills Fine Arts Center at 7.00pm. There are no tickets required, so you might want to arrive early. And if you haven't read the book, it's a great read, and the movie is really good as well. Definitely a "Must Read" and "Must See" for any space/astronomy aficionado.

COMPUTER LANGUAGE HELP: Does anyone in the club know the "Delphi" computer language? If you do, please contact Kevin Jung. He has a few questions for you.

GRAAA ONLINE FORUM: Just a reminder of the forum for club members. It's a great place to get the latest scoop on club (and general astronomy) news, observing tips & tricks, and a whole bunch of other fun and informative things for all members to share in. You can find a link to the Forum in the Members' Section of the website.

DID SOMEONE SAY THERE WAS A COMET? Since it's been nearly 100% cloudy here, not many people in West Michigan were able to see Comet McNaught as it made its spectacular visit to the inner solar system.



Comet McNaught (C/2006 P1) as viewed from the SOHO satellite. The bright dot just to the right of the head of the comet is the planet Mercury

Of course, it was spectacular in the southern hemisphere. The image on the cover of this issue was taken by Jim Barclay, Director of the South Burnett-Maidenwell Observatory in Australia.

DIG DEEPLY TO SEEK LIFE ON MARS: Probes seeking life on Mars must dig deeply into young craters, gullies, or recently exposed ice to have a chance of finding any living cells that were not annihilated by radiation, researchers report in a new study. One promising place to look for them is within the ice at Elysium, site of a recently discovered frozen sea, they say.

Current probes designed to find life on Mars cannot drill deeply enough to find living cells that may exist well below the surface, according to the study. The study maps cosmic radiation levels at various depths, taking into account surface conditions in various areas of Mars. The lead author, Lewis Dartnell of University College London, said: *"Finding hints that life once existed—proteins, DNA fragments, or fossils—would be a major discovery in itself, but the Holy Grail for astrobiologists is finding a living cell that we can warm up, feed nutrients, and reawaken for studying."*

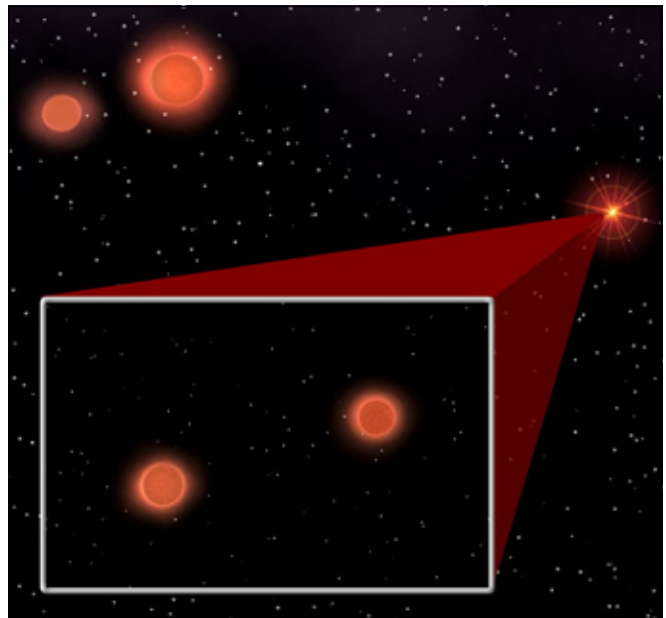
PHYSICISTS DEVELOP TEST FOR 'STRING THEORY':

For decades, scientists have taken issue with "string theory"—a theory of the universe which contends that the fundamental forces and matter of nature can be reduced to tiny one-dimensional filaments called strings—because it does not make predictions that can be tested.

But researchers at the University of California, San Diego, Carnegie Mellon University, and The University of Texas at Austin have now developed an important test for this controversial "theory of everything." Their test involves measurements of how elusive high-energy particles scatter during particle collisions. Most physicists believe those collisions will be observable at the Large Hadron Collider, or LHC, a subatomic particle collider scheduled to be operating later this year at the European Laboratory for Particle Physics, or CERN.

FIRST LARGE INFRARED LIGHT SURVEY OF CLOSEST YOUNG STAR PAIRS YIELDS NEW MULTIPLE STELLAR SYSTEMS IN OPHIUCHUS STAR FORMING REGION: After three years of observations using the 10-meter *Keck II* telescope in Hawaii, Lowell Observatory astronomer Lisa Prato announces discovery of four new low-mass double star systems with separations similar to the Earth-Sun distance or smaller. This survey also serendipi-

tously revealed five new wider binaries with separations of about 14 to 140 times the Earth-Sun distance. The results provide significant new evidence to better characterize the star and planet forming region in Ophiuchus.



This computer-generated illustration depicts a new complex quadruple star system. The star shown (inset) is a spectroscopic binary star discovered by Lowell Observatory astronomer Lisa Prato.

"These very closely spaced young, low-mass star pairs are really exciting," said Prato, summarizing results of her study presented today at the American Astronomical Society meeting in Seattle. "We can accurately measure the mass ratios and ultimately the component masses of these pairs, along with their abundance and other properties. These measurements give us new information about star and planet formation in regions just now being probed at this level of detail and resolution."

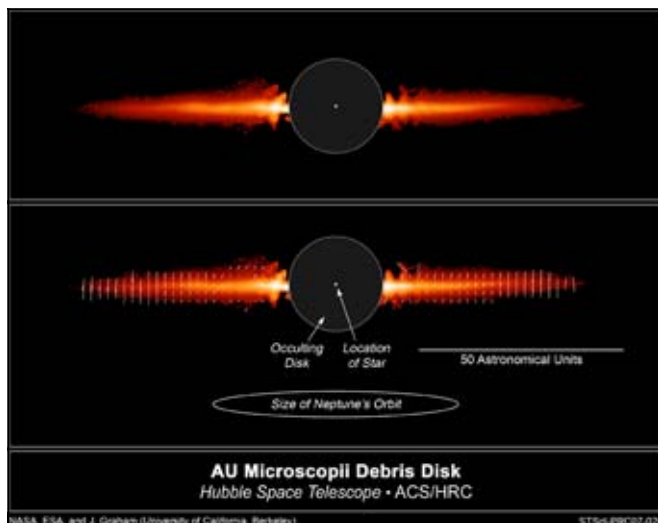
NEW NASA ORBITER SEES DETAILS OF 1997 PATHFINDER SITE:

The high-resolution camera on NASA's *Mars Reconnaissance Orbiter* has imaged the 1997 landing site of NASA's *Mars Pathfinder*, revealing new details of hardware on the surface and the geology of the region.

The *Pathfinder* mission's small rover, *Sojourner*, appears to have moved closer to the stationary lander after the final data transmission from the lander, based on tentative identification of the rover in the image. *Pathfinder* landed on July 4,

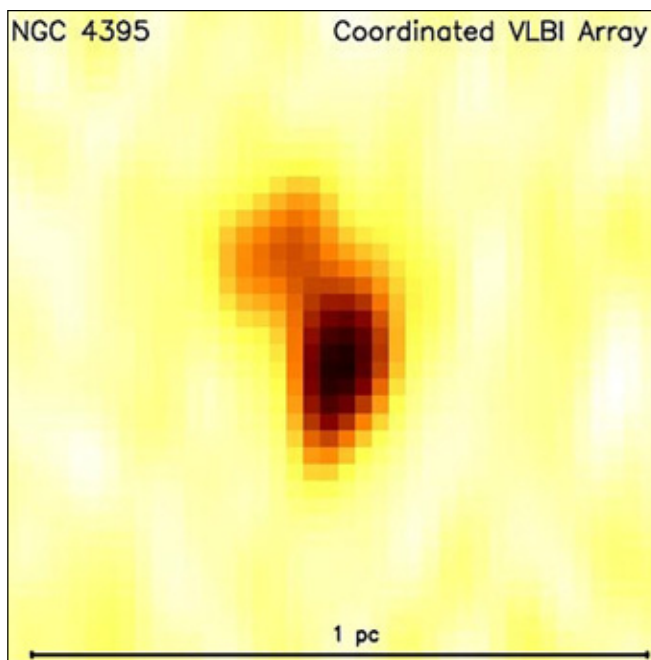
1997, and transmitted data for 12 weeks. Unlike the two larger rovers, *Spirit* and *Opportunity*, currently active on Mars, *Sojourner* could communicate only with the lander, not directly with Earth.

HUBBLE OBSERVATIONS PROVIDE INSIGHT INTO PLANET BIRTH: New observations from NASA's *Hubble Space Telescope* have begun to fill gaps in the early stages of planet birth.



Hubble observed a "blizzard" of particles in a disk around a young star revealing the process by which planets grow from tiny dust grains. The particles are as fluffy as snowflakes and are roughly ten times larger than typical interstellar dust grains. They were detected in a disk encircling the 12-million-year-old star AU Microscopii. The star is 32 light-years away in the southern constellation of Microscopium, the Microscope.

RADIO TELESCOPES PROVIDE KEY CLUE ON BLACK HOLE GROWTH: Astronomers have discovered the strongest evidence yet found indicating that matter is being ejected by a medium-sized black hole, providing valuable insight on a process that may have been key to the development of larger black holes in the early Universe. The scientists combined the power of all the operational telescopes of the National Science Foundation's National Radio Astronomy Observatory (NRAO) to peer deep into the heart of the galaxy NGC 4395, 14 million light-years from Earth in the direction of the constellation Canes Venatici.



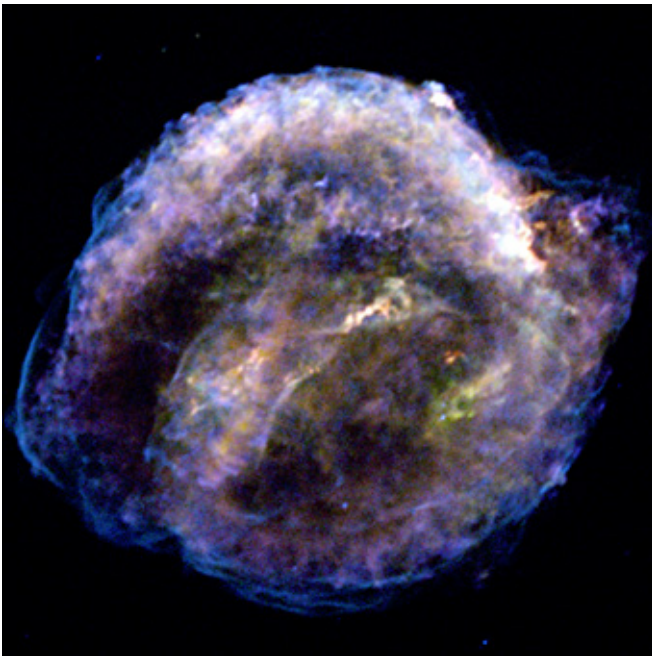
VLBI image of extended radio emission from core of NGC 4395, indicating suspected outflow powered by black hole. CREDIT: Wrobel & Ho, NRAO/AUI/NSF

"We are seeing in this relatively nearby galaxy a process that may have been responsible for building intermediate-mass black holes into supermassive ones in the early Universe," said Joan Wrobel, an NRAO scientist in Socorro, NM. Wrobel and Luis Ho of the Observatories of the Carnegie Institution of Washington in Pasadena, CA, presented their findings to the American Astronomical Society's meeting in Seattle, WA.

MAGELLANIC CLOUDS MAY BE JUST PASSING THROUGH: The Large Magellanic Cloud (LMC) and Small Magellanic Cloud (SMC) are two of the Milky Way's closest neighboring galaxies. Both are visible only in the southern hemisphere. By studying their orbits, astronomers can learn about both the histories of the Clouds and the structure of the Milky Way (from its influence on the Clouds' motions).

Astronomers Nitya Kallivayalil and Charles Alcock (Harvard-Smithsonian Center for Astrophysics) and Roeland van der Marel (Space Telescope Science Institute) have made the most accurate measurements to date of the three-dimensional velocities through space of the LMC and SMC. Their surprising results hold profound implications for both the Milky Way and its companions.

A STAR'S DEATH COMES TO LIGHT: Chandra X-ray image of Kepler's Supernova Remnant Using NASA's *Chandra X-ray Observatory*, scientists have created a stunning new image of one of the youngest supernova remnants in the galaxy. This new view of the debris of an exploded star helps astronomers solve a long-standing mystery, with implications for understanding how a star's life can end catastrophically and for gauging the expansion of the universe.

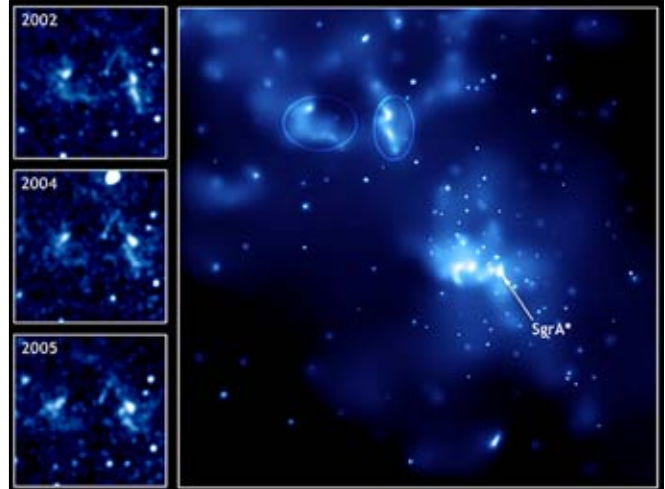


Over 400 years ago, sky watchers -- including the famous astronomer Johannes Kepler -- noticed a bright new object in the night sky. Since the telescope had not yet been invented, only the unaided eye could be used to watch as a new star that was initially brighter than Jupiter dimmed over the following weeks.

CHANDRA DISCOVERS LIGHT ECHO FROM THE MILKY WAY'S BLACK HOLE: Like cold case investigators, astronomers have used NASA's *Chandra X-ray Observatory* to uncover evidence of a powerful outburst from the giant black hole at the Milky Way's center.

A light echo was produced when X-ray light generated by gas falling into the Milky Way's supermassive black hole, known as Sagittarius A* (pronounced "A-star"), was reflected off gas clouds near the black hole. While the primary X-rays from the outburst would have reached Earth

about 50 years ago, the reflected X-rays took a longer path and arrived in time to be recorded by Chandra.



VLBA HELPS BUILD NEW PICTURE OF STAR-FORMING REGIONS: New, high-precision distance measurements by the National Science Foundation's Very Long Baseline Array (VLBA) radio telescope are providing a major advance for astronomers trying to understand how stars form.

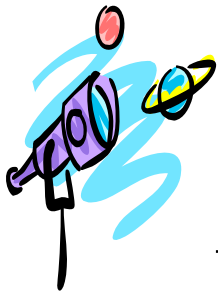
"A large improvement in measuring the distance to a young, still-forming star means a large improvement in measuring characteristics such as its mass and intrinsic brightness," said Laurent Loinard, of the National University of Mexico (UNAM).

"Most of what we know about the processes of star formation has come from studying young stars in a few, relatively nearby regions," Loinard said.

INFORMATION SPOT: Luminosity is the measure of the rate of energy flowing from a source, like a galaxy, star, or light bulb. Luminosity tells astronomers how fast energy "leaks" from the star. Luminosity is a measure of power divided into units called watts. Given the luminosity of a star, an astronomer can calculate the distance to the star by measuring the star's brightness. Temperature and luminosity are related, but dependent on the mass and size of a star.

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...news to be continued next month

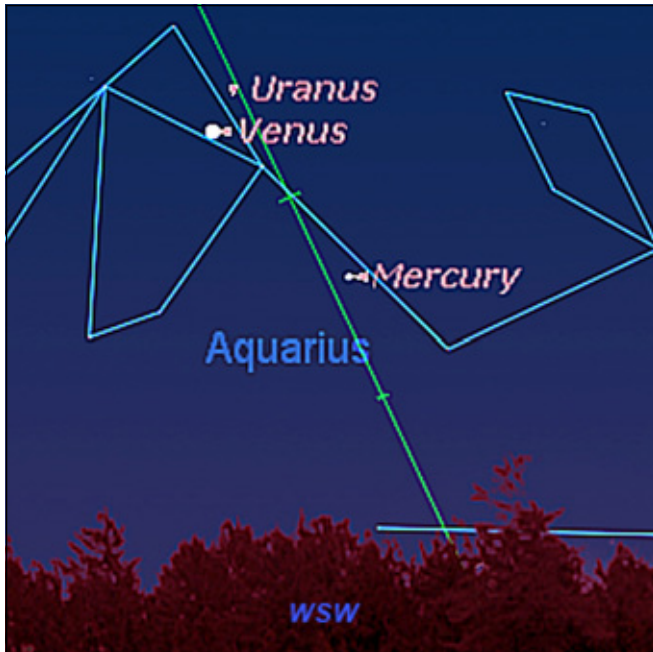


The Solar System: February, 2007

By Jeff Kozarski

The ice cold wintry February nights brings two bright planets opposite each other in the evening sky. As Venus is setting in the SW, Saturn rises in the east. Mercury also makes a brief visit below Venus for several weeks while Mars & Jupiter are visible before sunrise.

Mercury is at greatest elongation in the evening sky on the 7th. This is a pretty favorable evening apparition for Mercury this year. Look for it to the lower right of much brighter Venus on the 7th a half-hour after sunset. It will be shining fairly bright at -0.4 magnitude. Mercury begins dropping lower each evening after elongation and will be difficult to find after the 15th as it dimming rapidly. Inferior conjunction is on the 23rd.



On the evening of the 7th a half-hour after sunset, Mercury in the evening sky.

Venus doubles its evening elevation from last month to nearly 20° after sunset on the 15th. It sets 2 hours after the Sun at mid-month. Though it is still small through a telescope, Venus is bright at -3.9 magnitude.



On the evening of the 19th a half-hour after sunset, a 7% waxing crescent moon joins Venus.

February 2007 Lunar Data:

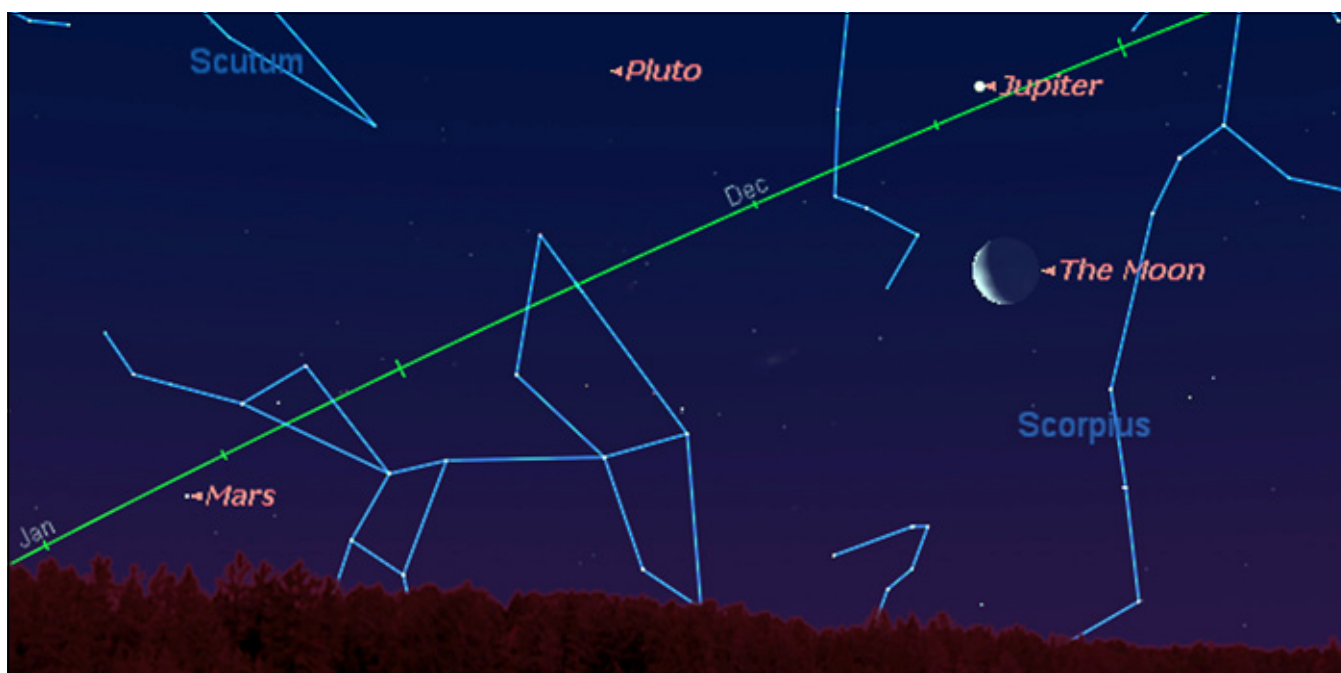
- ☆ Full Moon on the 2nd at 12.45 am EST
- ☆ Last Quarter on the 10th at 4.51 am EST
- ☆ New Moon on the 17th at 11.14 am EST
- ☆ First Quarter on the 24th at 2.56 am EST

Mars is in the morning sky in Sagittarius for most of the month. It crosses over into Capricornus at the end of the month. It is slow to gain elevation as the angle of the ecliptic to the horizon is still fairly shallow. Mars rises about $1\frac{1}{2}$ before the Sun on the 15th and is only 7° up 45 minutes before sunrise. It is dim too at $+1.3$ magnitude and only $4.3''$ of arc wide through a telescope.

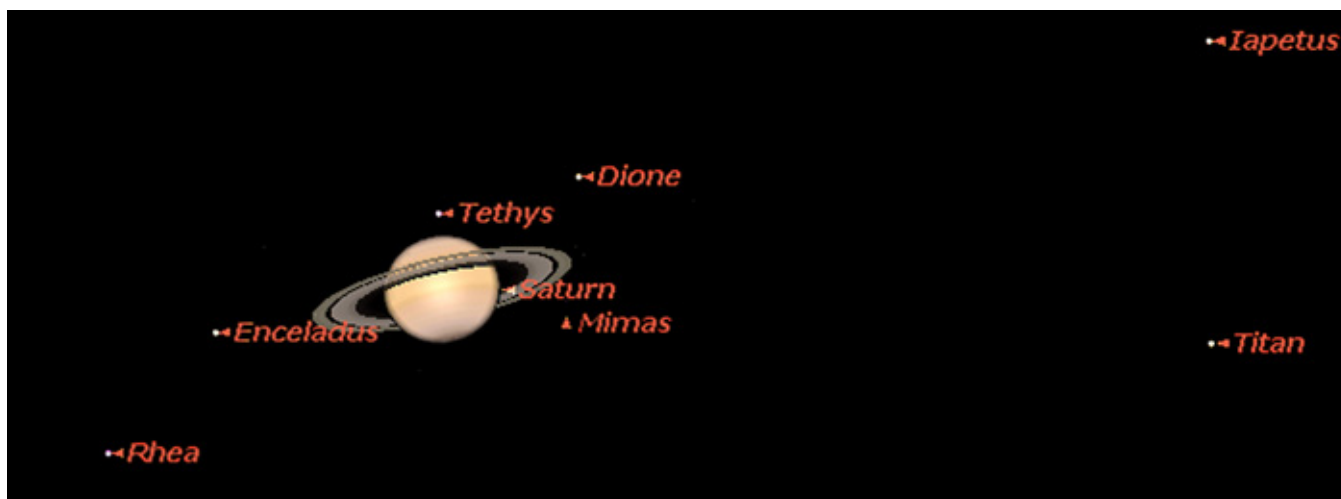
Jupiter is in Ophiuchus, a bright -2.0 magnitude object in the SE morning sky. It increases to $35''$ of arc wide in a telescope. By the end of February, Jupiter is transiting the meridian at sunrise but is still 4 months from opposition.

Saturn is at opposition on February 10th in Leo about 8° from Regulus. The rings are currently tilted 14° and appear $45''$ of arc wide. It is currently $20''$ of arc wide and shines at -0 magnitude. Saturn transits the meridian around 1:00 a.m. EST on the 11th at 61° above the horizon. That is plenty high enough to provide clear steady views through a telescope.

Uranus and **Neptune** are both too close to the Sun's glare to observe this month. Neptune is in conjunction on the 8th and Uranus early in March.



Jupiter, the moon & Mars 45 minutes before sunrise on the morning of the 12th.



Saturn with its moons at opposition at midnight on the 11th.



Twenty Years Ago: A Star Goes “Boom!”

by Kevin S. Jung

If you were in the southern hemisphere in late February of 1987, and just happened to be looking in the direction of the Large Magellanic Cloud, you would have been surprised by a new star that suddenly appeared near the Tarantula Nebula (30 Doradus, or NGC 2070). Ian Shelton was imaging the LMC the evening of the 23rd from Las Campanas Observatory in Chile, and - observing a “new” object on photographic plates - subsequently went outside to make a visual observation. At the same time Oscar Duhalde at the observatory discovered the star visually. Thus were the first observations of the first supernova to be seen in the year: SN1987A.

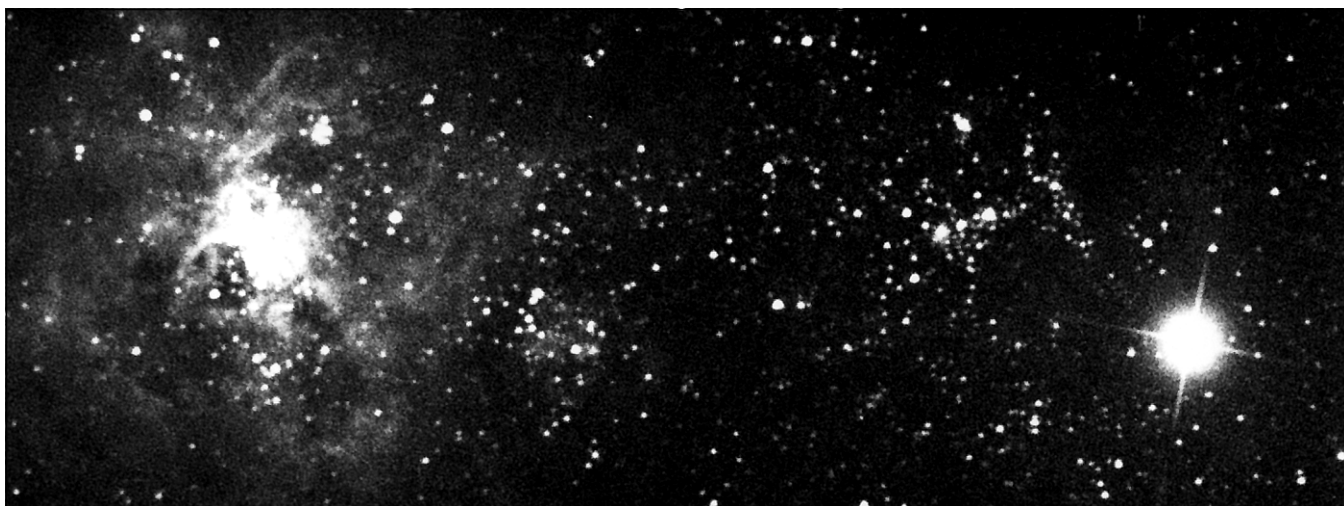
The progenitor of the supernova is star Sanduleak -69° 202, which was a blue supergiant. Originally astronomers were looking for a red supergiant, because at the time blue supergiants were not considered a possibility for a supernova event in existing models of high mass stellar evolution. However, all the evidence pointed to but Sanduleak -69° 202, so it was finally recognized as the culprit.

Recent discoveries regarding the curious triple-ring nebula surrounding the star have led researchers to believe that Sanduleak -69° 202 is a class of unstable blue supergiant stars, called luminous blue variables, which eject mate-

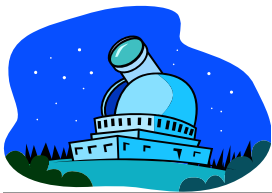
rial from their surfaces in recurring, volcano-like eruptions before they finally die in a supernova explosion.



So twenty years later, we are still learning from an event that actually happened ~170,000 years ago.



NGC 2070 (left) and SN1987A (right) from Queensland Australia. This image was taken on February 28, 1987 at 10.30UT by Jim Barclay.



Why One Should Use the Latest Technology

by GM Ross

My dithering about whether or not to use the Latest Technology has come to an end. By all means. The *coup de grace* struck on the morning of 10 December 2006 at dawn. First, however, there is a brief detour down memory lane...

In the 1970s I had a friend, Daniel L_____, or rather a former friend even before his tragic death in a Sarnia hospital in the summer of 1982. In any case, he once said something to me which captured his personality. When I indicated I would like to do the work of a Ph.D. but dispense with the degree, his reply was that he would like a Doctorate. Why? "Just to say I have it."

So it is with the Latest Technology. I do not care whether I ever use it, or whether its use would be efficacious. I do not care whether it is expensive or delicately engineered and prone to spurious results, difficult calibration, or outright failure. It is enough just to have it, like someone who drives a Land Rover every morning on the commute from Troy to Southfield, like someone who will camp outside the computer store all night eating trail mix to be the first kid -- ooops -- guy on his block to own PlayStation 3. If something is Latest Technology, so ends the matter.

10 December last was an exercise in the Earliest and Latest Technology. It was on the warm side for early winter, snow on the wane. At two days short of last quarter, the Moon was no particular impediment to variable star observing, so roused by my wind-up travel alarm with hour and minute hands in the wee hours, I grudgingly rose to confront the Cosmos. None of the observing gear I donned whilst half asleep was made of GoreTex[®] or Thinsulate[®]. Of course, nothing was purchased "on line," because a) it is too old, b) I would not be caught dead. Since I was a cross-eyed hazard to the motoring public, the 1999 Ford practically drove itself even though it is not equipped with OnStar[®] because we are not sufficiently paranoid to require it.

At the Veen Observatory my luck ran out. Instead of using the dear old worn lock with the key I regularly lost, I used the Latest Technology,

the card reader with the guest card because I had lost mine, keeping up a tradition. But I found my spiritual way once in the West Dome with the mighty Borr Telescope. My variable star charts are not on a laptop, but on paper, some so old they are *blueprints*. Without "go to" I brought the 16" to bear on the fast sinking SY Canis Majoris. It was bad: seeing really dodgy from the warm air flow and the view filmed over by what I assumed was low altitude mixed with moonlight. (By the way, Saturn was less than one-half degree below the Moon.) After taking the best reading possible, not with C.C.D., mind you, but with eyeball, and with the datum entered not on disc but with ballpoint pen, I moved on to RR Hydrae. (Again by the way, the Veen was deserted by users of eyeball, C.C.D., photo-electric photometry, glass plates, or fast breeder reactor for that matter, save *moi*). The view of RR was horrible, indistinct, even muddy. Something *had* to be wrong!

After a lot of cursing, literally, I discovered that the Maxfield[®] filter system on the pier had been left on, effectively giving the Borr a cataract. After mashing buttons like a man possessed I disengaged the filter(s) and swung the telescope all the way back to the now even lower SY CMa. I was almost undone by the Latest Technology, and wished for the "simple joys of maidenhood" with my 6" Newtonian on a pipe fitting mount. In any case I made the second -- correct -- observation of SY, and took the indomitable Borr back to RR Hya. There were more variable stars in the "glass" that morning, and to repeat, without "go to," just my vast skill of decades as the Glenn Gould of the slew paddle.

But my historic duty as dawn patrol for the American Association of Variable Stars Observers was only part of the reason to be up that Moon flooded morning, and frankly not even half the story. This was the day of the triple conjunction of 2006. Guy Ottewell in his splendid AS-TRONOMICAL CALENDAR gave it star billing: get out and see it.

(Continued on page 12)

Note: These articles are courtesy NASA Space Place Program at the Jet Propulsion Laboratory.

A Great Big Wreck

by Dr. Tony Phillips

People worry about asteroids. Being hit by a space rock can really ruin your day. But that's nothing. How would you like to be hit by a whole galaxy?

It could happen. Astronomers have long known that the Andromeda Galaxy is on a collision course with the Milky Way. In about 3 billion years, the two great star systems will crash together. Earth will be in the middle of the biggest wreck in our part of the Universe.

Astronomer John Hibbard isn't worried. "Galaxy collisions aren't so bad," he says. A typical spiral galaxy contains a hundred billion stars, yet when two such behemoths run into each other "very few stars collide. The stars are like pinpricks with lots of space between them. The chance of a direct hit, star vs. star, is very low."

Hibbard knows because he studies colliding galaxies, particularly a nearby pair called the Antennae. "The two galaxies of the Antennae system are about the same size and type as Andromeda and the Milky Way." He believes that the Antennae are giving us a preview of what's going to happen to our own galaxy.

The Antennae get their name from two vast streamers of stars that resemble the feelers on top of an insect's head. These streamers, called "tidal tails," are created by gravitational forces—one galaxy pulling stars from the other. The tails appear to be scenes of incredible violence.

But looks can be deceiving: "Actually, the tails are quiet places," says Hibbard. "They're the peaceful suburbs of the Antennae." He came to this conclusion using data from GALEX, an ultraviolet space telescope launched by NASA in 2003.

The true violence of colliding galaxies is star formation. While individual stars rarely collide, vast interstellar clouds of gas *do* smash together. These clouds collapse. Gravity pulls the infalling

gas into denser knots until, finally, new stars are born. Young stars are difficult to be around. They emit intensely unpleasant radiation and tend to "go supernova."

GALEX can pinpoint hot young stars by the UV radiation they emit and, in combination with other data, measure the rate of star birth. "Surprisingly," Hibbard says, "star formation rates are low in the tidal tails, several times lower than what we experience here in the Milky Way." The merging cores of the Antennae, on the other hand, are sizzling with new stars, ready to explode.

So what should you do when *your* galaxy collides? A tip from GALEX: head for the tails.

To see more GALEX images, visit www.galex.caltech.edu. Kids can read about galaxies and how a telescope can be a time machine at spaceplace.nasa.gov/en/educators/galex_puzzles.pdf.



Caption: This GALEX UV image of the colliding Antennae Galaxies shows areas of active star formation, which is not in the tidal tails as one might expect.



ROGER B. CHAFFEE PLANETARIUM

Public Museum ,Grand Rapids

February 2007 Show Schedule

February 1 – February 11

For general audiences

COWBOY ASTRONOMER - Modern science and the old west meet under a dark starlit prairie sky in this unique look at the contrast between Native American sky lore and today's view of the universe. Noted cowboy poet and humorist Baxter Black narrates. **40 Minutes**

SHOWTIMES: Daily at 2:00 pm.

UNDER STARLIT SKIES - THE HUNTER AND HIS HOUNDS This is a continuation of the regular series of sky shows in which prominent planets, stars and constellations currently visible are illustrated. The planets Venus and Saturn are in the evening sky throughout this period. To accompany the Museum's *Pets in America* exhibition, constellations portraying animals, are emphasized. These include Orion and his two celestial hunting dogs, Canis Major and Canis Minor. **40 minutes**

SHOWTIMES: Saturday & Sunday at 3:00 pm.

Added Value: This show is free with paid Museum admission; or arrive after 2.30 pm for the planetarium show only and pay only \$3.00/ person.

For children and family audiences

THE LITTLE STAR THAT COULD - In this delightful fantasy, a "Little Star" wakes up, looks around and finds that he is surrounded in the universe by a diverse group of other stars. He learns that some have planets, and then discovers that he too has a wonderful family, called the Solar System. **30 Minutes**

SHOWTIMES: Saturday and Sunday at 1.00 pm.

For general audiences

SPECTACULAR MUSIC AND LIGHT SHOWS --

The most popular music of famous rock bands is drawn from their legendary albums. High powered sound is accompanied by stunning visual effects on the planetarium's giant projection dome. *Pink Floyd-Wish You Were Here* also includes spectacular multicolored laser light. Separate \$7.00 admission each show. **45 minutes**

SHOWTIMES: Friday and Saturday evenings:

No shows Sat. Feb. 3 only

Emerson, Lake & Palmer – *Brain Salad Surgery* 8:30 pm.

Pink Floyd - *Wish You Were Here* 9:30 pm.

Shows February 12 - February 28

Featured show: for general audiences

VOYAGE TO INFINITY - Explore the depths of the universe as participants in an imaginary space voyage. Drift among star clusters, nebulae and galaxies, probing deep into space and far back in time. Latest concepts about the nature of the universe are vividly illustrated with full dome images, video and multiple special effects, accompanied by a stirring soundtrack. As part of the "One Book-One County" collaboration with KISD, an eight minute prologue highlighting the first 50 years of the space age will be shown at each performance. **40 minutes**

SHOWTIMES: Daily at 2:00 pm

For children and family audiences

SOLAR SYSTEM SAFARI - In this all new sky show for younger children and family groups, A jungle adventurer uses his "magical camera" to take visitors on an imaginary "safari" to the major bodies in the Solar System. Each comes alive, taking on a unique "personality" while describing its characteristics and oddities. **35 minutes**

SHOWTIMES: Saturday and Sunday at 1:00 pm

For general audiences

UNDER STARLIT SKIES - This is a continuation of the regular weekend sky shows in which prominent planets, stars and constellations currently visible are illustrated. The planets Venus and Saturn are visible throughout winter and spring, and are joined by Jupiter in late spring.

40 minutes

SHOWTIMES: Saturday and Sunday at 3:00 pm

Added Value: This show is free with paid Museum admission; or arrive after 2:30 p.m. for the planetarium show only and pay only \$3.00/ person.

For general audiences

SPECTACULAR MUSIC AND LIGHT SHOWS -

Music drawn from the two most popular albums of the legendary rock band Pink Floyd is accompanied by high powered sound, stunning laser light and other visual effects on the planetarium's giant projection dome. Separate \$7.00 admission each show. **45 minutes**

SHOWTIMES: Friday and Saturday evenings:
(No Shows Friday, Feb. 23rd only)

Pink Floyd – *Dark Side of the Moon* at 8:00 pm

Pink Floyd - *The Wall* at 9:00 pm

Why One Should Use the Latest Technology

(Continued from page 9)

The south-east horizon at the Veen Observatory was not good enough, and would not have been even twenty years ago. This asterism would be really, really low in the twilight. Mercury, Jupiter, Mars.

The Ford without a working radio went down the Observatory road flank speed as the first light of day appeared. Going improvidently fast down 36th during black powder season, I hung a left on Snow, south, and half way to Cascade Road for a horizon almost as good as a seascape over a sleeping field still covered white. Waited... waited... then, there it was! Mercury coming out of the compressed blur of bare trees. *How bright.* Not too often have I ever seen him so bright. Then just behind Mercury rose Jupiter. What a pair in the deep blue of the new horizon, one below the other, like the "cat's eyes" of Scorpius.

Now Mars? I strained my eyes though the best pharmacy specs money will buy (the \$330

jobs having given up the ghost). Nothing. I ran into the field for some kind of a better view or against the chance a wisp of unseen cloud might be obscuring the Red Planet. Still nothing. Averted vision, but I still could not see him. Twilight was building. Then for the second time that observing session I started swearing, because like a complete fool, a wino, I had failed to bring along the Latest Technology: the sixty year-old 6X binoculars with only one working optic after dropping them in the bottom of a rowboat in the 1960s. I was not using Technology and was paying the price! The gods had me in their crosshairs, proud Man. Mars was invisible to the naked eye on the right of Mercury and Jupiter, certainly at this elevation, and I was cast into failure, screwed and tattooed.

It was a beautiful morning, on the other hand. I duly went to breakfast down Kissing Rock Road a couple of hours later using the Earliest Technology, i.e. walking, and bragged a blue streak anyway.

**Grand Rapids Amateur Astronomical Association
Membership Application or Renewal Form**

DATE: _____

☐ **New Membership** ☐ **Renewal**

Please fill out the information below as completely as possible.
For Family memberships, please include all persons for whom membership is desired.

Please Print

Name: _____ Birthdate: _____

Name: _____ Birthdate: _____

Name: _____ Birthdate: _____

Name: _____ Birthdate: _____

Name: _____ Birthdate: _____

Name: _____ Birthdate: _____

Address: _____

City: _____ State: _____ Zip: _____

Home Phone: _____ Cell Phone: _____

E-Mail: _____

(Note: For Family members, if more than one e-mail address, please list others on back of application)

☐ **Adult** (18 or older, a Minimum of \$40.00) \$ _____

☐ **Student** (through 17 yrs old, a Minimum of \$25.00) \$ _____

☐ **Family** (all members of one family, a Minimum of \$50.00) \$ _____

(Note: Contributions greater than the minimum dues are considered a donation and are tax-deductible)

☐ **Observatory Endowment Fund** \$ _____

☐ **Miscellaneous Donations** \$ _____

(Note: Contributions to these funds are tax-deductible. Indicate amount of donation)

☐ **OBSERVATORY USER FEE:** (a Minimum of \$25.00 per user) \$ _____

(Contributions of more than \$25 will help meet repairs and upgrade of equipment costs.)

If you are a qualified user of the Veen Observatory, and wish to remain so, check
the box for **"User Fee."**

TOTAL ENCLOSED (From all categories above) \$ _____

Make Check or Money Order to:

GRAND RAPIDS AMATEUR ASTRONOMICAL ASSOCIATION (or GRAAA)

Mail to: Jerry Persha, GRAAA Treasurer
199 Smith St.
Lowell, MI 49331

Grand Rapids Amateur Astronomical Association
3308 Kissing Rock Ave. SE
Lowell, MI 49331-8918