REFLECTIONS REFRACTIONS

of the University Lowbrow Astronomers

March, 2000

The University Lowbrow Astronomers is a club of Astronomy enthusiasts which meets on the third Friday of each month in the University of Michigan's Physics and Astronomy building (Dennison Hall, Room 130 or 807). Meetings begin at 7:30 pm and are open to the public. Public star parties are held twice a month at the University's Peach Mountain Observatory on North Territorial Road (1.1 miles west of Dexter-Pinkney Road; further directions at the end of the newsletter) on Saturdays before and after the new Moon. The party is canceled if it's cloudy or very cold at sunset. For further information call (734)480-4514.

Hubble Takes a Close-up View of a Reflection Nebula NGC 1999 in Orion. Credit NASA

Just weeks after NASA astronauts repaired the Hubble Space Telescope in December 1999, the Hubble Heritage Project snapped this picture.

This Month:

March 11 - Public Star Party at Peach Mountain Observatory -
March 17 - Meeting at 130 Dennison - Come and find out what we will be talking about
March 11, 18, 25 - Saturday Morning Physics, 170 Dennison Bldg. - "Nuclear Magnets: From Atomic Clocks to Medical Imaging" by Professor Timothy Chupp.

Next Month &Beyond

April 1 - Public Star Party at Peach Mountain Observatory
April 8 - Public Star Party at Peach Mountain Observatory
April 14- Computer subgroup Meeting at 807 Dennison, 7:30 pm -
April 21- Meeting at 130 Dennison , 7:30 pm-
April 29 - Public Star Party at Peach Mountain Observatory
April 1,8,15,22 - Saturday Morning Physics
May 6 - Public Star Party at Peach Mountain Observatory
May 19 - Meeting at 130 Dennison
May 27 - Public Star Party at Peach Mountain Observatory
June 3 - Public Star Party at Peach Mountain Observatory

NGC 1999 **is an example of a reflection nebula. Like fog around a street lamp, a reflection nebula shines only because the light from an embedded source illuminates its dust; the nebula does not emit any visible light of its own. NGC 1999 lies close to the famous Orion Nebula, about 1,500 light-years from Earth, in a region of our Milky Way galaxy where new stars are being formed actively. The nebula is famous in astronomical history because the first Herbig-Haro object was discovered immediately adjacent to it (it lies just outside the new Hubble image). Herbig-Haro objects are now known to be jets of gas ejected from very young stars.**

The NGC 1999 nebula is illuminated by a bright, recently formed star, visible in the Hubble photo just to the left of center. This star is cataloged as V380 Orionis, and its white color is due to its high surface temperature of about 10,000 degrees Celsius (nearly twice that of our own Sun). Its mass is estimated to be 3.5 times that of the Sun. The star is so young that it is still surrounded by a cloud of material left over from its formation, here seen as the NGC 1999 reflection nebula.

The Path of Astronomy

Kristina Nyland
February 1, 2000

On cool, crisp, moonless nights when I shift my gaze towards the heavens and lose myself amidst the vast expanse of stars floating atop a sea of ebony, I often wonder how I chanced to find the path of astronomy. I am not certain whether I will ever fully understand the root of my fascination with the sky. It's haunting beauty is unparalleled and the secrets it holds are as boundless as time itself. The stars seem to have a magical quality and glimmer and twinkle like freshly polished gemstones set out to dry in the warmth of the sun. The sky itself is a canopy of blackness - a dark oblivion into which I beam and dare to dream of my future in astronomy.

The heavens offer a much needed respite from the jaded activities of ordinary life. The sky has simply become a realm that I cannot imagine life without. The stars have become embedded and intertwined within my character - nothing could ever wrench them away from me. The resplendency of images of the universe never ceases to be a source of inspiration and hope for me.

Perhaps searching for a reason behind my love of the stars is a futile endeavor. It could be that it was simply my destiny to become an astronomer. Beyond the blue of the earth where the forces of nature play dice with the destinies of the denizens of the cosmos, "lucky seven" was rolled in my honor. And maybe there is no reason at all. But whatever the catalyst for my love of the sky, I am eternally grateful for it.

It's gotten colder now and I should be returning to the world of ordinary life once again. But, before I depart, I will take one final glance at the silvery stars sprinkled across the obsidian sky. As they twinkle at me in the stillness of night I am filled with a sense of wonder and I realize that these tiny treasures in the sky give me serenity, direction and meaning.

The Beauty of the Moment

By Mark Deprest

Astronomy is a uniquely personal and solitary pastime, and one that I have enjoyed and embraced passionately for years. But astronomers (at least the ones I've met) are very gregarious and sharing people. They are always gathering together at big star parties or club open houses or even backyard social events. They use photographic and CCD technology to capture the wondrous beauty of what they have beheld in their instruments of astronomy. Sometimes for the science, but most of the time it is to share with others. I, myself have always tried to faithfully portray the vistas my equipment has afforded me, through drawings made at the eyepiece. Throughout this time I have wanted to share the beauty and enjoyment that astronomy has given to me, and toward this endeavor I have always failed, miserably. How many times have I called someone over to my telescope or pointed out some naked eye astronomical conjunction or phenomena, only to spoil the beauty of the moment by spouting out every bit of scientific fact and figure that I can recall, about the how and why of this event. Completely forgetting that what I really wanted to share was the emotion the view sparked in me. That uniquely personal feeling of wonder and joy and excitement and passion that we initially felt when we first turned our eyes to this view. While showing a photograph of the Crescent Moon and Venus to some friends, I found myself explaining the angular separation and the dynamics of earthshine. At on point I heard myself actually telling the photographic admirer the star near Venus was 28 Sagittarius and that is apparent visual magnitude was 5.3, I was totally out of control. You don't need to know how the pigment was made or even applied to the canvas to appreciate the beauty of Van Gogh's "Starry Night." As astronomers it is nice to know the science of what we observe, but it is not necessary to know the science in order to have the majesty of "Nature's Masterpiece" touch ones emotions. So to para-phrase a friend; "Grab some photons tonight, with a friend in silence. It may warm both your Hearts.

Bits & Pieces

By Bernard Friberg

Meteor showers:

March is characterized by low sporadic rates and minor meteor showers. The Delta Leonids, active from Feb 15 to March 10 may peak in early March. The Virginids, active from Jan 25 to April 15, produces several peaks. Past activity suggests that early March may be the best. The Gamma Normids are active from Feb 25 to March 22 and may have a slightly increased activity from Mar 11 to the 18th and peaking on the 13th. The chance of seeing a fireball increases in the two months of April and May. The Lyrids are active from April 16 to the 25th and the Puppids are active from April 15 to the 28th. The Eta Aquarids are active from April 19 to May 28 and The Sagitarids are active from Apil 15 to July 15th.

Our Moon:

The full moon in February is called the Snow Moon, the Hunger Moon, or the Wolf Moon. The full moon in March is called the Sap Moon, the Crow Moon or the Lenten Moon. In April its called the Grass Moon or Egg Mooin and in May its called the Planting Moon or Milk Moon. This year the full moon in March occurs nearly at midnight on the 19th, just a few hours before the March 20 vernal equinox. The sun crosses the celestial equator on this day and the length of the days and nights are the same. The sun is at the midpoint along the ecliptic, the path of the sun through the sky. A clearer picture of the earth and its tilt may be obtained by drawing a picture. Draw a circle placing the sun at the center and the earth on the left. Tilt the North pole away from you by 23.5 degrees. This is the position of the earth on March 20. The sun is at its midpoint along the ecliptic. Make another dot at the bottom of the circle, this is the position of the earth 3 months later in June. The North pole is tilted away from you and pointing 23.5 degrees towards the sun. The sun will be at its highest point in the sky at noon.

The Planets:

This year we not only have March and the beginning of Spring to look forward to, we also have a lineup of the planets to observe. At the beginning of the month Mars is low in the West just after dark with Jupiter and Saturn above. When the sun is 7 degrees below the horizon shortly after 7 pm, Jupiter is 39 degrees and Saturn 48 degrees above the horizon. As the month progresses, Mars and Jupiter appear to be moving towards Saturn with Mars moving at a much faster rate towards Jupiter and Saturn. On March 8 our Moon is positioned just to the left of Mars, on the 9th, the Moon is to the left of Jupiter, and on the 10 th, the Moon is above and to the left of Saturn. By the end of the month Mars is only 2 degrees away from Jupiter, a Kodak moment. There are many picture taking opportunities in the month of March, but April will be better. On April 4, 5, and 6th, Mars will appear to be very close to Jupiter.

On April 5 th, the Moon is 8 1/2 deg below Jupiter. On April 6 th, Mars and Jupiter are separated by only a degree, Saturn is 5 deg away and our Moon is only 3 deg to the left of Saturn. This is the evening Mike Huff has invited everyone to his farm. The location has a very low horizon to the West.

The Near Earth Asteroid Rendezvous Mission

Credit NASA **submitted by BF**

The Near-Earth Asteroid Rendezvous (NEAR) mission is the first launch in the Discovery Program, a NASA initiative for small planetary missions with a maximum 3-year development cycle and a cost capped at $150 million for construction, launch, and 30 days of operation. The NEAR mission was designed and built by The Johns Hopkins University Applied Physics Laboratory in Laurel, Maryland. In addition, the JHU-APL is controlling the entire flight from its Mission Operations center on-site in Laurel. This is the first time a NASA mission has been run by a non-NASA facility.
The spacecraft was successfully launched on February 17, 1996, at 3:43 p.m. EST. In January, 1998, the spacecraft swung by Earth for a gravity assist. The ultimate goal of the mission is to rendezvous with and achieve orbit around the **Near-Earth-Asteroid 433 Eros** in February, 2000, and **study the asteroid for approximately one year at altitudes as close as 15 miles (24 kilometers) to the asteroid's surface.**

As the first spacecraft to orbit an asteroid, the NEAR mission promises to answer fundamental questions about the nature and origin of near-Earth objects, such as the numerous asteroids, meteoroids, and comets in the vicinity of Earth's orbit. These objects are of interest for several reasons. First, they are the primary source of large bodies that collide with Earth, greatly influencing the evolution of the atmosphere and life on Earth. The composition, bulk properties, and provenance of asteroids are key links in establishing the connection between meteorites and the history of asteroids, and in better quantifying the nature of the impact hazard that the asteroids pose to Earth. An asteroid collision with Earth was likely responsible for the mass extinction at the end of the Cretaceous period, and another impact in 1908 destroyed thousands of square kilometers of forest near Tunguska, Siberia. In addition, clues to the nature of early solar system processes and conditions are pre

served in various forms on small bodies like asteroids, comets, and meteorites. The near-Earth population of asteroids, in particular, is believed to contain clues to the nature of the building blocks from which the inner planets, including Earth, were formed.

The NEAR mission will make the first quantitative and comprehensive measurements of an asteroid's composition and structure. The measurements have been identified by the National Academy of Sciences as the most important scientific objectives in the exploration of primitive bodies. Primary scientific goals of the NEAR mission are to measure:

Bulk properties: Size, shape, volume, mass, gravity field, and spin state Surface properties: Elemental and mineral composition, geology, morphology, and texture Internal properties: Mass distribution and magnetic field.
Science data and related products will be archived in near real-time in NASA's Planetary Data System, with access for the general science community, the public, and educators through the Internet.

News (Mar 3)
A 22-second engine burn on March 3 put NEAR into a near-circular orbit around asteroid Eros. The spacecraft is now operating approximately 124 miles (200 kilometers) from the center of the asteroid and will stay in that orbit until April 1. Over the next four weeks, NEAR will collect images and data for a detailed global surface map, a topographic model and a more precise estimate of gravity on Eros.

"We expect to resolve a lot of the features that we've only seen glimpses of," says Louise Prockter, a member of NEAR's imaging team.
On March 2, the NLR recorded the first ever laser range returns from an asteroid. The first radar range returns from an asteroid were obtained from Arecibo, Puerto Rico to Eros in 1975.

NEAR's Multispectral Imager will snap enough photos to create color and monochrome maps of Eros' surface. By measuring the distance between NEAR and Eros, the Laser Rangefinder will begin to shape three-dimensional perspectives of the craters, ridges and various other features in the images. The craft's radio science equipment will use the closer orbit to get a better reading of the asteroid's gravity field.

With a little help from the sun, the satellite could also get its first readings of the asteroid's elements. The X-Ray Spectrometer detects fluorescence from elements that react to solar x-rays. "A lot depends on solar activity," says Ralph McNutt, X-Ray/Gamma Ray Spectrometer instrument scientist. "If there is a strong solar x-ray event, the instrument will get a good measurement."

Moving 3 miles an hour relative to Eros, NEAR will circle the rotating space rock three full times during this orbit. NEAR operates at this range until April 1, when another short engine burn will gradually move it into a 60-mile (100-kilometer) orbit. The asteroid and spacecraft are about 152 million miles (almost 245 million kilometers) from Earth.

The NEAR team will analyze and present its findings from the orbit over the next several months, including a potential first look at the data during a March 13 press briefing at the Lunar and Planetary Science Conference in Houston.
Although the focus of the NEAR mission is on asteroids, NEAR has made an important contribution to the study of cosmic gamma ray bursts as part of the Interplanetary Gamma Ray Burst Network, known as the IPN.
March 9, 2000
Although the focus of the NEAR mission is on asteroids, NEAR has made an important contribution to the study of cosmic gamma ray bursts as part of the Interplanetary Gamma Ray Burst Network, known as the IPN. Gamma ray bursts are the most powerful explosions in the Universe - exceeding even the exploding stars called supernovae. First discovered in the late 1970's by defense early warning satellites, gamma ray bursts last for only tens of seconds, but during that brief time they are the brightest gamma ray emissions in the entire sky. The sources of gamma ray bursts are distributed uniformly around the sky, and for decades after their discovery scientists were unsure as to whether most of these sources were exotic objects within our own galaxy or much farther away, at "cosmological" distances (meaning that the sources are so far away that gamma rays, moving at the speed of light, require a significant fraction of the age of the universe to travel to Earth). The farther away the sources of the gamma ray bursts, the greater must be the energy release to explain the brightness of the bursts. If the bursts originated within our galaxy, they would not match the energy releases in supernovae, but as we have learned in recent years that the burst sources are at cosmological distances, they far outshine the supernovae.
The IPN has played a key role in this advance, by providing precise localizations of the burst sources rapidly enough to allow identification of their optical and radio counterparts before they fade from view. If

the host galaxy can be identified, its redshift can be measured from spectra to find the distance to the burst. The IPN localizes sources by timing the burst detections at spacecraft mutually separated by great distances. If a burst is detected by only two spacecraft, or in other words if there is only one baseline, then the burst source can be anywhere on a ring in the sky. With a third spacecraft in the network, the burst is localized to either of two points in the sky. Before NEAR, the IPN consisted only of a constellation of satellites in Earth orbit plus the Ulysses spacecraft at around 5 AU from the sun, so there was only one interplanetary baseline. NEAR at Eros provides the additional interplanetary baselines that allow the IPN to locate burst sources to within about 3 arc minutes - roughly, the angle subtended by a 1 meter plate at a distance of 1200 meters. This is fine enough to enable detection of optical and radio counterparts to burst sources.

Before NEAR became the third leg in the IPN tripod, a total of about 10 cosmological burst sources were discovered and identified. In only a few months of operation within IPN, NEAR has enabled four more source definitions that would otherwise have been impossible. Since the IPN with NEAR now resolves about 1 source per week (including those also localized by other missions), within this year IPN should double the total number of identified sources.

This exciting advance has been enabled by NEAR's gamma ray spectrometer, which was modified after launch (with a software patch) to be able to detect gamma ray bursts. The NEAR spacecraft engineering team also worked hard to refine the accuracy of spacecraft timing to within 100 milliseconds. The upshot is, as NEAR studies Eros over the next year, it is also contributing to the study of gamma ray burst sources. Scientists are still unsure as to how these bursts are produced, but one possibility is that they result from the merger of binary neutron stars - creating a compound object initially about the same size as Eros, but containing more mass than our entire solar system.

The NEAR Magnetometer

The NEAR Magnetometer does what a compass does but without moving parts, and it has special electronics and a computer hooked up to it that pick out the magnetic field signals, turn them into data, and send them to the NEAR radio dish (antenna) to be sent back to Earth.

Why does the NEAR Magnetometer have to be different than the compass? Think about these questions:

Can you see the needle on the compass your friend holds up across the room?
Can you read your friend's compass if you are in your house and he is in his house?
Can you read your compass if all the lights in the house are turned off?
You know that in space objects are far from the Earth so we can't look at the compass with our eyes to see its measurements. That's why we need to fly an automatic/electronic compass that can radio its readings back to Earth.

Asteroid 433 EROS

One of the largest and best observed near-Earth asteroids is 433 Eros, discovered in 1898 independently by G. Witt (Germany) and A. Chalois (France). Eros accounts for half of the volume of all near-Earth asteroids. The potato-shaped Eros is one of the most elongated asteroids, with estimated dimensions of 35 x 15 x 13 kilometers, so it almost fits within the Baltimore Beltway. Eros orbits around the Sun with a perihelion of 1.13 AU (169,045,593 km) and 1.78 AU (266,284,209 km), and it rotates once every 5.27 hours. Though it is an S type asteroid, it is somewhat varied in its chemical composition. Its opposite sides have slightly different mineral characteristics. The gravity on Eros is very weak but enough to hold a spacecraft. There is no air and no evidence of water. The day time temperature of Eros is about 100 C while at night in plunges to -150 C.
Although information already known about Eros was obtained by telescope and the use of radar, more extensive research of Eros is planned. On February 17, 1996, NASA launched a spacecraft to orbit Eros as part of their Near Earth Asteroid Rendezvous mission.

The Abrams Planetarium *Sky Calendar* and Star Chart on the following pages are reprinted with permission of Abrams Planetarium. A full-year subscription is $9.00. To subscribe send name and address to:

Sky Calendar
Abrams Planetarium
Michigan State University
East Lansing, MI 48824

Be sure and check out their web site at: http://www.pa.msu.edu/abrams/

Unusual conjunction gathering of all three bright outer planets: Jupiter, until it disappears late this month, is the brightest evening planet. At mag. –2.6 it outshines Sirius, the brightest star, by half a magnitude. An hour after sunset at start of month, Jupiter is flanked by two other planets low in the west, while Sirius twinkles in SSW. Sirius remains visible until late-May, but just after sunset in mid-June Jupiter sinks into bright twilight in WNW around the end of 3rd week of April. **Saturn** is 6° to 4° upper left of Jupiter in first three weeks; while 9.5° S of fainter Mars April 12-16; 4° to 7° below Mars April 20-26. Saturn follows Jupiter into the twilight glow by a few days. **Mars**, of mag. +1.4 to +1.5, is fastest-moving member of gathering of three planets in weekend sky at dusk. Mars begins this month as lowest of the trio, 2.3° lower right of Jupiter on April 1. All these planets sink lower into the twilight glow each evening, with Jupiter and Saturn sinking faster. Mars passes 1° N of Jupiter on April 5 and 2.3° N of Saturn on April 16. From that date on, Mars is the highest of the three planets. By April 22 Mars is 5° above Saturn, 8° below the Pleiades, and 18° lower right of Aldebaran, eye of Taurus. Mars ends this month as the only visible evening planet, at the sole remaining low in WNW, 12° to lower right of similarly colored Aldebaran.

Watch especially for: On April 5, the young crescent Moon is seen by the planet gathering at dusk. On April 6, the 2-day-old crescent Moon hovers left of Saturn at the top of the triangle of planets. During April 6-17, all three planets fit into a field less than 6° across for 12 consecutive evenings, and will easily fit with in the view of 7-power binoculars. On **April 6, 11, 16, 20, and 21**, the planets are arranged in an isosceles triangle. On the evenings of **April 14 and 15**, the trio of bright outer planets is just under 5° across, their most compact visible gathering since the between December 1901 and November 2081, an interval of 179 years!

Binoculars will enhance the view of all these groupings, and will help you follow the planets longer into April as they sink into the twilight glow.

The next three months of *Sky Calendar* will include the departure of Mars and a fine appearance of Mercury in the evening sky, and the promising emergence of Jupiter and Saturn appearing even closer together than in April, and closer than they'll be again until Dec. 2020. Stay with us!

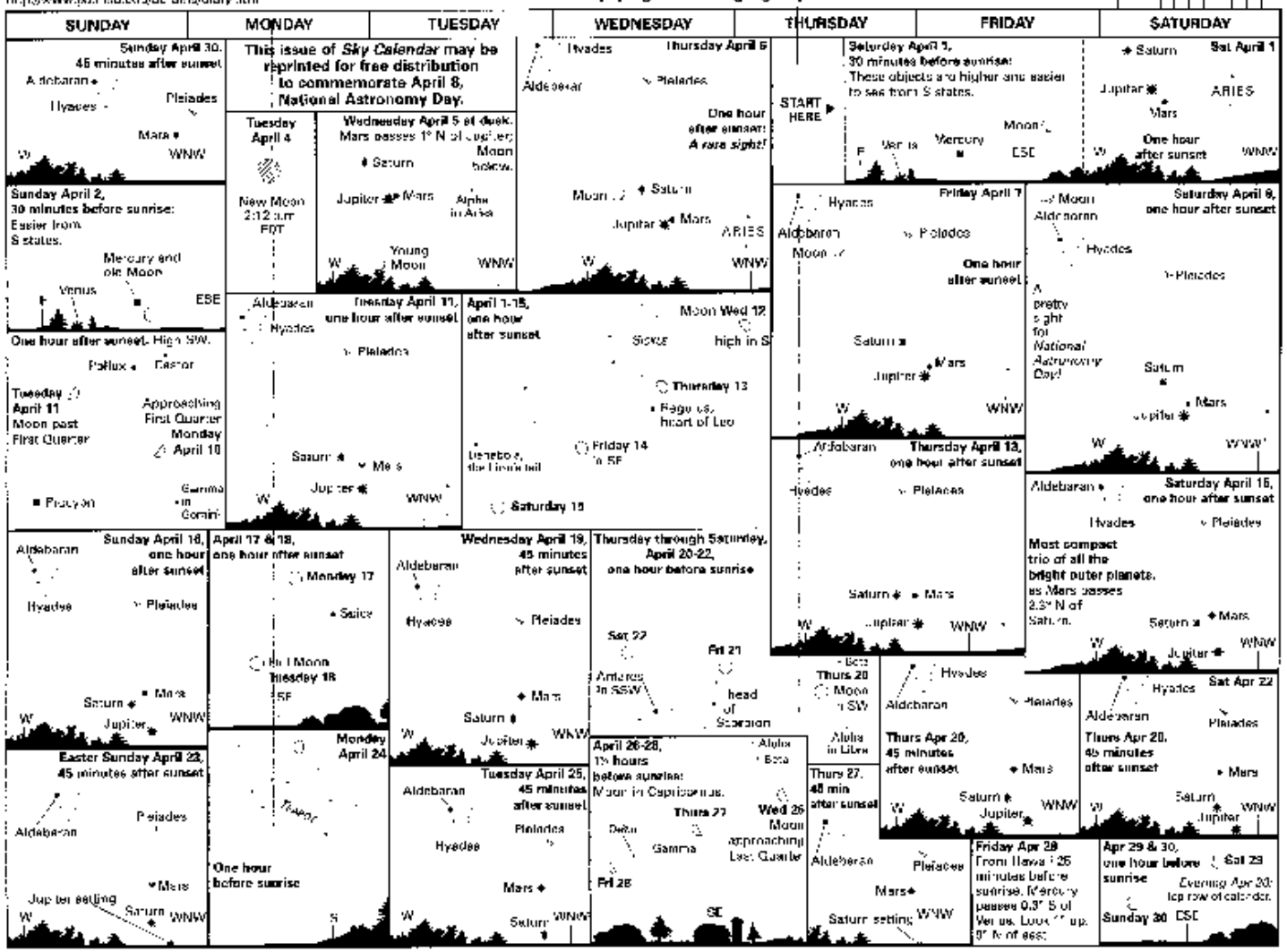
Planetarium business office:
(517) 355-4676
Skywatcher's Diary on World Wide Web:
http://www.pa.msu.edu/abrams/diary.html

©ABRAMS PLANETARIUM

SKY CALENDAR APRIL 2000

An aid to enjoying the changing sky

Use this scale to measure angular distances between objects on diagrams below.



Robert C. Victor, Patti Toivonen, Elissa Saniel
ISSN 0733-6314

Subscription: $9.00 per year, starting anytime, from *Sky Calendar*, Abrams Planetarium, Michigan State University, East Lansing, MI 48824

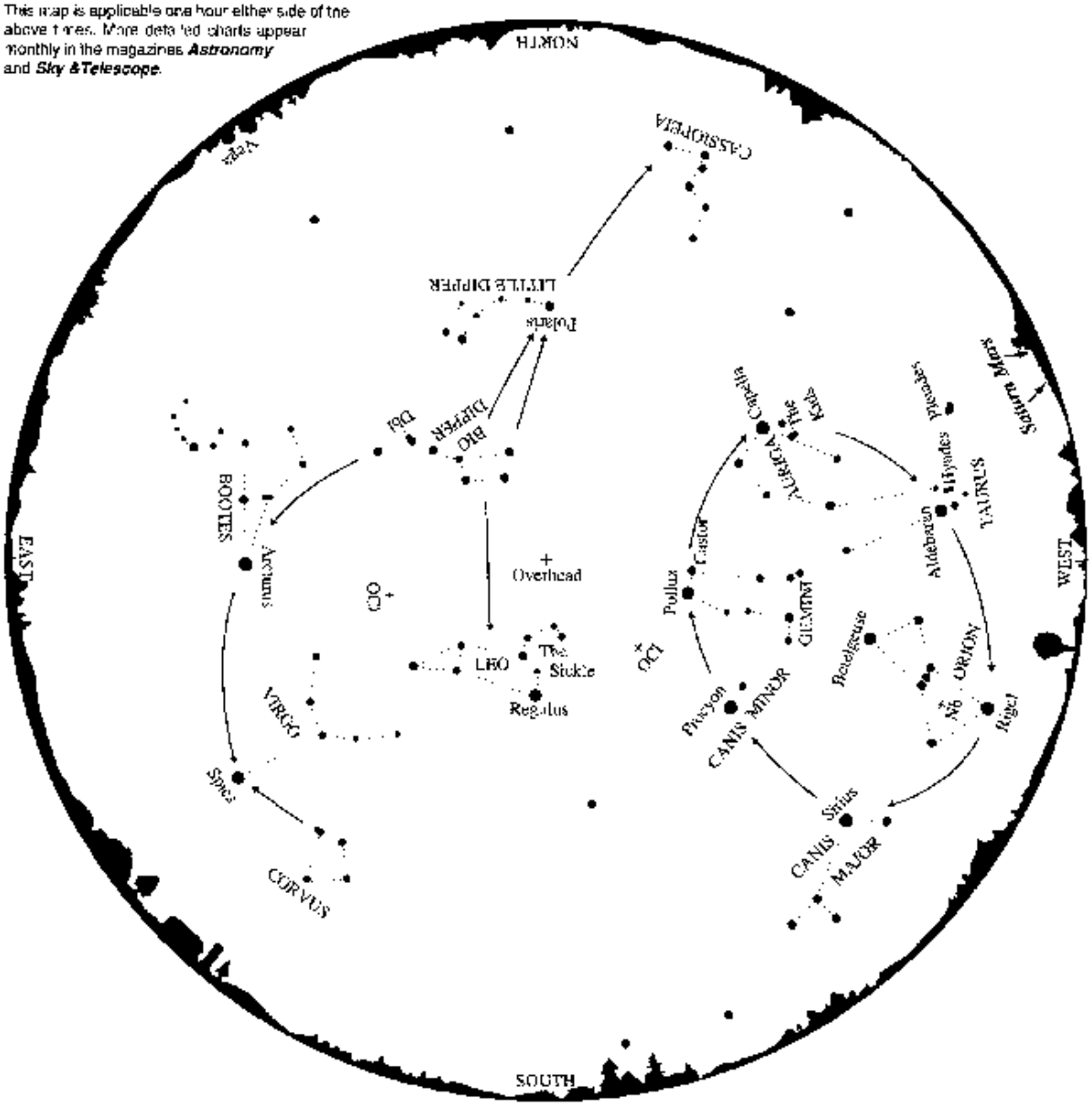
April Evening Skies

This chart is drawn for latitude 40° north, but should be useful to stargazers throughout the continental United States. It represents the sky at the following local standard times:

Late March	10 p.m.
Early April	9 p.m.
Late April	8 p.m.

This map is applicable one hour either side of the above times. More detailed charts appear monthly in the magazines ***Astronomy*** and ***Sky &Telescope***.

© 2000 Abrams Planetarium
Subscription: $9.00 per year, from ***Sky Calendar*** Abrams Planetarium, Michigan State University, East Lansing, MI 48824-1324.



At chart time 11 stars of first magnitude or brighter are visible. In order of brightness they are: Sirius, Arcturus, Vega, Capella, Rigel, Procyon, Betelgeuse, Aldebaran, Spica, Pollux, and Regulus. The planets Mars and Saturn have just set. Those positions are noted in the WNW. In addition to stars, other objects that should be visible to the unaided eye are labeled on the map. The double star Dubhe at the bend of the handle of the Big Dipper is easily detected.

The famous Orion Nebula, a cloud of gas and dust out of which stars are forming, is marked (Nb) in that constellation. The open or galactic star cluster (OCl) known as the "Beehive" can be located between the Gemini twins and Leo. Coma Berenices, "The Hair of Berenice," is another open cluster (OCl), between Leo and Bootes. Try to observe these objects with unaided eye and binoculars.

—D. David Batch

Announcements

written and/or assembled by BF

1. **Request for historical photos -----**

Prof. Pat Seitzer and the Lowbrows are desperately seeking photographs of the 15" reflector and 10" refractor in Angell Hall Observatory (before the recent renovation) . Both telescopes have been removed to storage . Copies of the photos will be made and originals returned. Your name will remain with the photos. They will be used by the Astronomy Dept, sent to the Bentley historical collection and displayed on the Lowbrow web site. Please notify Pat Seitzer and/or B. Friberg if you have these photos in your file.

2. On clear nights **check** your e-mail and/or 4804514 if you are interested in going to Peach Mountain.

3. Mike Huff has invited everyone to his farm April 6 to view the planets and Moon line up.

4. **FAQs-**

Q -- What is this Kensington event.

A -- A very big event is scheduled at Kensington July 21 & 22, sponsored by the GLACC group. Most of the astronomy groups/clubs in Southeastern MI are part of GLAAC. More about this in the following months Reflections.

Q -- I would like to see the complete Lowbrow **Y2000 schedule.**

A -- Open house/Star party at Peach Mountain: **4/1, 4/8, 4/29, 5/6, 5/27, 6/3, 6/24, 7/1, 7/29, 8/5, 8/26, 9/2, 9/23, 9/30, 10/21, 10/28, 11/18, 11/25, 12/23, 12/30**

Meetings at 130 or 807 Dennison:
3/17, 4/21, 5/19, 6/16, 7/??, 8/18, 9/15, 10/20, 11/17, 12/15. The July meeting may be rescheduled.

Leslie Science Center events:--6/9, 8/4

Do you have a question? Contact B. Friberg

5. **Telescope for sale.** This is the equipment I have for sale. There are eyepieces and books in addition to the telescope. Thank you for advertising in the Lowbrow newsletter.

Meade LX5 10" Schmidt-Cassegrain Telescope For Sale: This serious amateur telescope has a super plssl 26mm eyepiece (7) with excellent definition, resolution, and color correction. The electronic command center (1) has 8X scanning speed and 2X correcting speed. A 9 X 60mm polar illuminated viewfinder (5) is included, as is a 2" diagonal mirror (4). Use the quartz/pulse electronic drive system (3) to achieve sidereal-rate tracking within .005% of the sidereal frequency. The power panel display (2) lets you monitor telescope operations at a glance. The primary and secondary mirrors (6) are certified, laser-tested, diffraction limited and have multilayer coatings for maximum light transmission and image brightness. An equatorial wedge (9) is included with magnetic compass, latitude scale, bubble level and micrometric azimuth control. An adjustable field tripod provides stability. Optional accessories include declination motor, dew zapper (DC and AC), and DC splitter. $1350

Eyepieces For Sale
Teleview 1.8X Barlow $60
Teleview 10.5 mm Plssl $50
Teleview 17.0 mm Plssl $50
Teleview 55.0 mm Plssl $150

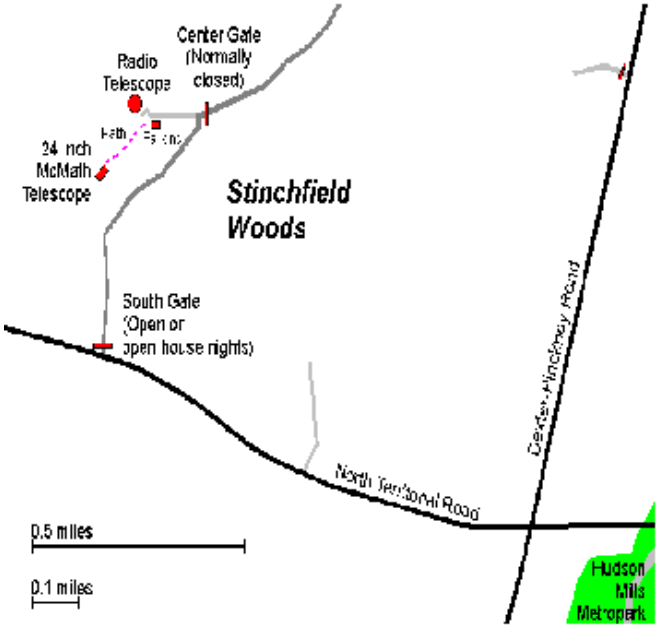
Charts and Books For Sale
Deluxe Sky Atlas 2000 (Color) $25
Amateur Astronomer's Field Guide to Deep Sky Observing - Lorrenzin &
Sechler $25
Amateur Astronomer's Catalog of 500 Deep-Sky Objects Vol. 1 by Morales $7
Index Card Finder Chart for Messier Objects (Each card has a constellation map,
a finder chart & other data) $5 Burnham's Celestial Handbook 3 vol. Set - Hardbound $30
Webb Society Deep-Sky Observer's Handbook Vols. 1,2,3,4 $20
Please reply to Toni Carroll using the address:
toni@sienahts.edu

6.-- Great Space Adventures is sponsored by Congresswoman Debbie Stabenow and co-sponsored by Michigan Space Grant Consortium and a number of regional organizations. The Lowbrow Astronomers will participate in the third annual Great Space Adventures Day on Sunday, April 16, 2000 from 12:00 noon 5:00 pm. Previously the Lowbrow Astronomers participated in Adventures with a table presentation. and the plan is to do the same this year. The location is the same, in the Electrical Engineering and Computer Science Building on the North Campus of the University of Michigan. **Volunteers** are needed. Please contact Bernard Friberg and/or Mark Deprest. Thanks.

7. On clear open house nights we can expect very large crowds. If you know of anyone that would like to share their telescope please notify me (B Friberg). Thanks

Places and Times:

Dennison Hall, also known as The University of Michigan's Physics and Astronomy building, is the site of the monthly meeting of the University Lowbrow Astronomers. It is found in Ann Arbor on Church Street about one block north of South University Avenue. The meeting is held in room 807. Monthly meetings of the Lowbrows are held on the 3rd Friday of each month at 7:30 PM. During the summer months, and when weather permits, a club observing session at Peach Mountain will follow the meeting.



Peach Mountain Observatory is the home of The University of Michigan's 25 meter radio telescope as well as the University's McMath 24 inch telescope which is maintained by the Lowbrows. The observatory is located northwest of Dexter. The entrance is on North Territorial Road, 1.1 miles west of Dexter-Pickney Road. A small maize-and-blue sign marks the gate. Follow the gravel road one mile to a parking area near the radio telescopes. Walk along the path between the two fenced in areas (about 300 feet) to reach the McMath telescope building.

Public Star Parties:

Public Open House/Star Parties are held on the Saturday before and after each new Moon at the Peach Mountain Observatory. Star Parties are canceled if the sky is cloudy at sunset or the temperature is below 10 degrees F. Call 480-4514 for a recorded message on the afternoon of a scheduled Star Party to check on the status. Many members bring their telescopes and visitors are welcome to do likewise. Peach Mountain is home to millions of hungry mosquitoes - bring insect repellent, and it does get cold at night so dress warmly!

Amateur Telescope Making Group meets monthly, with the location rotating among member's houses. See the calendar on the front cover page for the time and location of next meeting.

Membership:

Membership dues in the University Lowbrow Astronomers are $20 per year for individuals or families, and $12 per year for students and seniors (age 55/+). This entitles you to the monthly REFLECTIONS newsletter and the use of the 24" McMath telescope (after some training). Dues can be paid to the club treasurer Doug Scobel at the monthly meeting or by mail at this address:

1426 Wedgewood Drive
Saline, MI 48176

Magazines:

Members of the University Lowbrow Astronomers can get a discount on these magazine subscriptions:

Sky and Telescope: $29.95 / year
Astronomy: $29.00 / year

For more information contact the club Treasurer. Members renewing subscriptions are reminded to send your renewal notice along with your check when applying through the club Treasurer. Make the check payable to "University Lowbrow Astronomers".

Newsletter Contributions:

Members and (non-members) are encouraged to write about any astronomy related topic of interest. Call or E-mail to Newsletter Editors at:

Bernard Friberg (743)761-1875 Bfriberg@aol.com
Chris Sarnecki (734)426-5772 chrisandi@aol.com

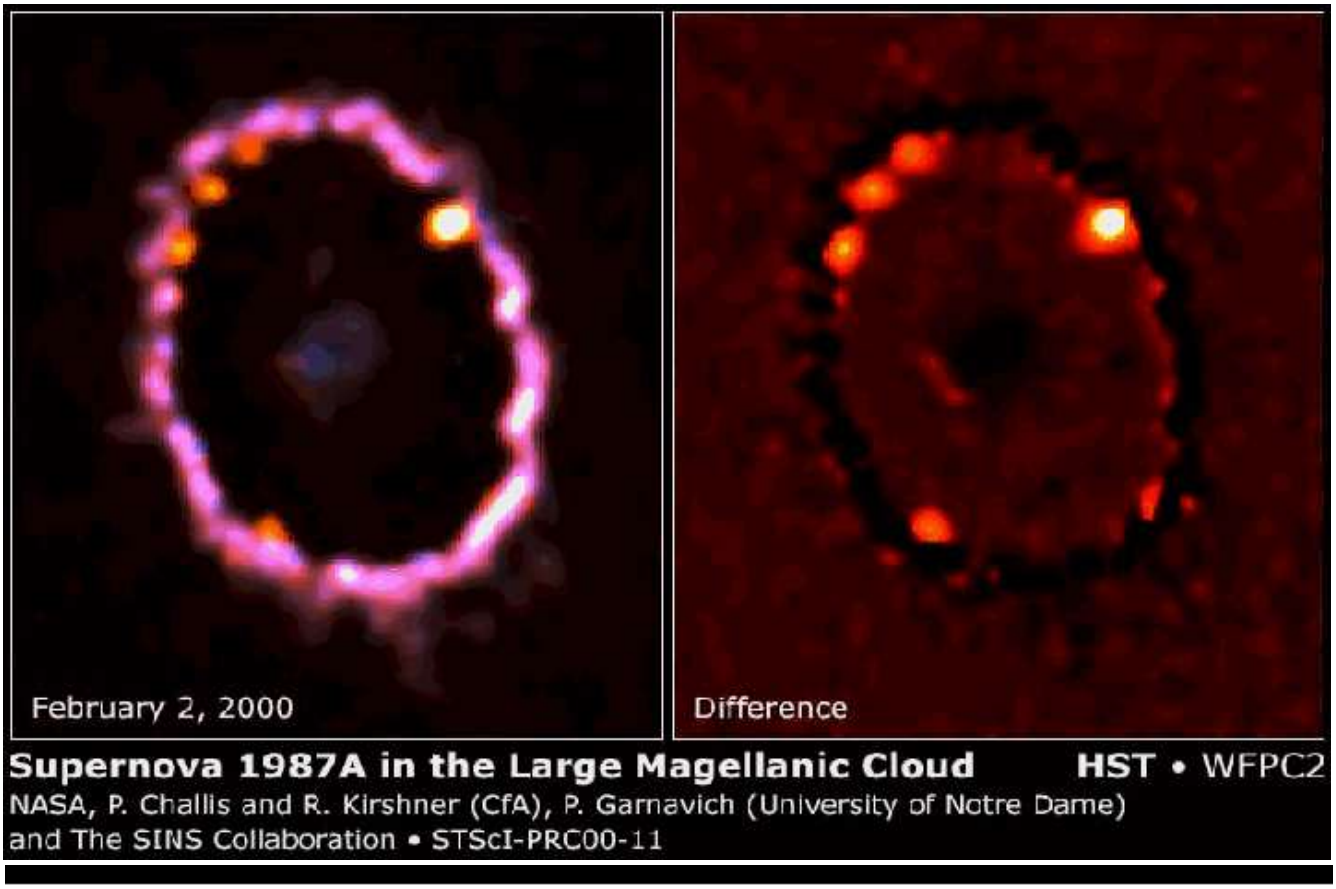
to discuss length and format. Announcements and articles are due by the first Friday of each month.

Telephone Numbers:

President: Mark Deprest (734)662-5719
Vice Presidents: Lorna Simmons (734)525-5731
Dave Snyder (734)747-6537
Paul Walkowski (734)662-0145
Treasurer: Doug Scobel (734)429-4954
Observatory Director: Bernard Friberg (734)761-1875
Newsletter Editors: Chris Sarnecki (734)426-5772
Bernard Friberg (734)761-1875
Keyholders: Fred Schebor (734)426-2363
Mark Deprest (734)662-5719

Lowbrow's Home Page:

http://www.astro.lsa.umich.edu/lowbrows.html
Dave Snyder, webmaster
http://www-personal.umich.edu/~dgs/lowbrows/



UNIVERSITY LOWBROW
ASTRONOMERS
3684 Middleton Drive
Ann Arbor, Michigan 48105