

REFLECTIONS

of the University Lowbrow Astronomers

March 1999



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 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 (313)480-4514.



Mars: Just The Facts

Credit: USGS, The Viking Project, NASA

Explanation: Mars, the freeze-dried planet, orbits 137 million miles from the Sun or at about 1.5 times the Earth-Sun distance. It has two diminutive moons, towering extinct volcanoes, an immense canyon system, a thin atmosphere chiefly composed of carbon dioxide (CO₂), a frigid average surface temperature of -63 degrees Celsius, and permanent frozen CO₂ polar caps which contain some water ice. Mars' surface presently lacks liquid water and has a reddish color because of an abundance of oxidized iron compounds (rust). A small terrestrial planet, fourth from the Sun, Mars has only about 3/8 the surface gravity of Earth. So for example, if you tip the scale at a hefty 200 pounds on Earth you'd be a 75 pound featherweight on Mars. The low martian gravity will be good for NASA's Mars Pathfinder spacecraft scheduled to land on Mars next Friday, July 4th. Using rockets, parachutes, and airbags, Mars Pathfinder will be the first spacecraft to touchdown on the planet since the Viking landers in 1976. Pathfinder is also scheduled to begin the first ever mobile surface exploration by releasing the robot rover, "Mars Sojourner". Astronomy Picture of the Day June 27, 1997

This Month:

March 13 - Public Star Party at Peach Mountain Observatory - Coma-Virgo cluster rising.

March 19 - Meeting at 807 Dennison - Tonight we will hear from the Mars Society speaking on the "Why Explore Mars".

March 20 - Public Star Party at Peach Mountain Observatory - Spring begins at 8:46 pm EST - Just in time for our observing!

March 21 - ATM Group - Mtg time & location TBD.

Next Month:

April 10 - Public Star Party at Peach Mountain Observatory - Mars should clear the trees after 10-ish and be at 15 arcseconds and 1.2 mag. You must see this.

April 16 - Meeting at 807 Dennison - Tonight we will hear from... We interrupt this message to inform you that, as is our tradition, CLUB ELECTIONS will be held tonight. Speaker will be TBD.

April 17 - Public Star Party at Peach Mountain Observatory - Mars is one week from opposition. Closest approach is May 1st.

April 18 - ATM Group - Mtg time & location TBD.

Freezing for Faint Fuzzies in February

fy Fark Fefrest (by Mark Deprest, sorry - Ed)

Well, another month has come and gone in this final year of the 20th Century, and if you didn't get out to "grab some photons" maybe this will warm your heart.

The Lowbrows kept themselves quite busy through the month of February. Hosting a wonderful speaker in The University of Michigan's Assistant Professor of Astronomy, Pat Seitzer at our last meeting on February 19th. Thank you, Pat, for a very interesting and enjoyable presentation on The University of Michigan's "Lost Observatory."

The Lowbrows also took part in the "Family Enrichment Night," sponsored by Chelsea Public Schools on February 18th. Special thanks to Reid Travis for his computer set up which was a nice addition to our Lowbrow Info kiosk. We were one of 65 display and info booths, at this event and we passed out a lot of cards and leaflets.

We also managed to have two very nice, but extremely cold Public Open Houses, at Peach Mountain Observatory. On February 13th, the evening started at 5:30 pm, when Dave Snyder and I met Lorna Simons and Charlie Nielsen at the gate. The sky was clear, the wind was calm, and the temperature was cold! Venus was low in the west-southwest and by the time the first few visitors showed up it was below the tree line. Jupiter was still high enough above the tree line that we were able to observe it until about 8:00 pm. Saturn, always a crowd pleaser, was well up in the night sky and most of the first timers jokingly accused us of pasting some sort of decal on the end of our scopes.

The real fun came when I began to show a young boy some of my "favorite frozen faint fuzzies" of the winter sky. With Charlie and Dave operating the 24" and Reid Travis with his 10" f/10 LX200, the worlds noisiest scope, (just kidding, Reid) keeping the small but enthusiastic crowd occupied. I sat down with my 8" f/6 dob and started picking off some of winter's best. I would find one of these gems and then let this 10-year take a look. As soon as he got the hang of the dob, I'd ask him to describe what he saw, to my great pleasure he was amazingly articulate and refreshingly accurate, with his descriptions. When he looked at the Great Orion Nebula, he said it looked like "a bluish fan shaped cloud with 4 bright stars in the center

that make kind of a squished square." He also said there was another "very faint up-side down coma shaped cloud just a little ways away from the fan." I doubt Messier himself could have described M41 and M42 any better. I decided to see how he would describe M31, M32 and M110. I swung the scope around to the west and caught this group of galaxies before they disappeared below the trees. I told him that I was going to show him three galaxies in the same field of view. I told him that they would look like fuzzy patches with bright centers, and I left it at that. He took a look in the scope and he told me, he could only see two fuzzy things with bright centers. I asked him to tell me where they were in the field of view. He told me that there was a big one that ran up and down through the view. I suggested 12 o'clock to 6 o'clock. He agreed and continued by telling me the other one that he saw was "very small and roundish, but real bright and at about 2 o'clock." Then he saw it, the third galaxy, M110, he said he didn't see it at first but while he was looking at the little bright one he noticed it. He said it was "very, very faint and kinda spread out over at about 9 o'clock." I told him what he just did, was to use averted vision to see the "Faint Fuzzies," a technique some of the well-seasoned observers use, he liked that.

His dad was getting cold and he was just getting warmed up, but dad had the car. I decided to show him one of my favorite open clusters, NGC 2362 in Canis Major. His view of this one went like this. "There is a bright star in the center of a triangle shape of little stars and kinda brightish stars out at the points of the triangle." Now for those of you, who have not actually seen this cluster in a telescope, it was featured in the February issue of Astronomy magazine on page 73, along with a picture that really doesn't do it justice.

Okay, there was time for one more test of this 10-year-olds descriptive power. I nudged the telescope a little over a degree and a half-north and centered the double star Hershel 3945, an Alberio look alike. Once again I relinquish control of the dob to my young pal and asked him to give me as complete a description as he could. Here is his quote, "I see two stars about the same brightness the top star looks reddish-orange with a little bit of yellow in it, and the bottom one is bluish-purple with maybe a little green." I was floored; he saw more colors in these two stars than anyone has a right to. Some how I wrestled my dob away from him and he and his frozen pop went home in the comfort of a too slow to heat up car, but I'll bet the 10 year old didn't notice. I'll bet his thoughts and his conversation were of the "Frozen

Faint Fuzzies of February" and how much fun he had telling the "hot shot astronomer" what they looked like. Well, after he left I noticed that Chris Sarnecki had shown up and had the "Cave" set up, we had a steady flow of guests throughout the evening and an incredibly clear sky. With Lorna making sure the guests' were greeted and properly parked, Charlie and Dave working the 24", Reid and 10" LX200, Chris and the "Cave" all of our guests were happy they braved the weather. Thank you all for making the first of two open houses in February a wonderful success.



A Supernova Star-Field

Credit: Hubble Heritage Team (AURA/ STScI/ NASA) [On the Web at: <http://heritage.stsci.edu/> - Ed]

Explanation: Bright stars don't last forever. A bright star similar to others in this field exploded in a spectacular supernova that was witnessed on Earth in 1987. The result is visible even today as unusual rings and glowing gas. The above picture is a composite of recent images taken over several years. The explosion originated from a bright massive star that ran out of nuclear fuel. SN1987A occurred in the Large Magellanic Cloud (LMC), a satellite galaxy only 150,000 light years from our Milky Way Galaxy. The rings of SN1987A are currently excited by light from the initial explosion. Astronomers expect the inner ring to brighten in the next few years as expanding supernova debris overtakes it.

About the Hubble Heritage Project

The Hubble Space Telescope (HST) is a research tool dedicated to scientific studies of nature. Enroute to illuminating the forces shaping our cosmos, HST has

accumulated a cosmic zoo. The Hubble Heritage Project sees this instrument also as a tool for extending human vision, one that is capable of building a bridge between the endeavors of scientists and the public. By emphasizing compelling HST images distilled from scientific data, we hope to pique curiosity about our astrophysical understanding of the universe we all inhabit.

The fact that all members of the Hubble Heritage Project team are astronomers and astrophysicists explains our atypical approach to constructing the pictures you'll find at our website. Rather than being one individual's expression, the images and website are visions produced by collaboration. Our process is similar to that of writing a scientific paper, or doing an experiment, with several contributors. In other words, as well as doing specified tasks, each member participates in directing the image composition, color selection, and other aspects. The people behind the Hubble Heritage Team signature are Keith Noll (Principal Investigator), Howard Bond, Carol Christian, Jayanne English, Lisa Frattare, Forrest Hamilton, Anne Kinney, and Zolt Levay.

Additionally, our astronomical background influences which image processing techniques we employ and our aesthetic decisions. For example, astronomical detectors are much more sensitive than the human eye. So we've decided that our final images should not be restricted to the scope of the human visual perception, either in brightness or in spectral range. In most cases, color assignments and brightness contrasts which emphasize subtle structures, as well as physical processes which generate delicate light effects, will take precedence over attaining, say, natural color.

The original source material for the Hubble Heritage Project images will be HST data obtained in 2 ways. Primarily we will mine the rich HST public archive of exposures that has been accumulating for almost a decade. Since HST is a research instrument, many of the most visually interesting objects, however, were never selected for study and therefore are missing from this archive. Additionally the favorites that have been scientific targets often lack HST exposures across a color range or the telescope's field of view only covers a small, unrecognizable portion of the form. Fortunately the Hubble Heritage Project has been granted a small amount of observing time over the next year. It is enough to satisfy the dual purpose of obtaining scientifically useful data and generating visually intriguing images of a few objects. Visitors to this website have been invited to help select a target from our proposed short list.

Although each month we plan to exhibit, at this website gallery, one additional picture distilled from HST exposures, we invite you to visit us more often than the first Thursday of every month. The supplemental illustrations, stories, explorations, and information will be updated continually. Also, raw data of the favorite targets will be posted as soon as the observations

occur and other activities will be announced as these events draw near.

The home of the Hubble Heritage Project is Space Telescope Science Institute which is run by the Association of Universities for Research in Astronomy for NASA.

Astronomers Discover Spectacular Structure in Distant Galaxy

Dave Finley, Public Information Officer
National Radio Astronomy Observatory
dfinley@nrao.edu

Researchers using the National Science Foundation's Very Large Array (VLA) radio telescope have imaged a "spectacular and complex structure" in a galaxy 50 million light-years away. Their work both resolves a decades-old observational mystery and revises current theories about the origin of X-ray emission coming from gas surrounding the galaxy.

The new VLA image is of the galaxy M87, which harbors at its core a supermassive black hole spewing out jets of subatomic particles at nearly the speed of light and also is the central galaxy of the Virgo Cluster of galaxies. The VLA image is the first to show detail of a larger structure that originally was detected by radio astronomers more than a half-century ago. Analysis of the new image indicates that astronomers will have to revise their ideas about the physics of what causes X-ray emission in the cores of many galaxy clusters. Frazer Owen of the National Radio Astronomy Observatory (NRAO) in Socorro, NM; Jean Eilek of the New Mexico Institute of Mining and Technology (NM Tech) in Socorro, NM; and Namir Kassim of the Naval Research Laboratory in Washington, DC, announced their discovery at the American Astronomical Society's meeting today in Austin, TX.

The new observations show two large, bubble-like lobes, more than 200,000 light-years across, that emit radio waves. These lobes, which are intricately detailed, apparently are powered by gravitational energy released from the black hole at the galaxy's center. "We think that material is flowing outward from the galaxy's core into these large, bright, radio-emitting 'bubbles,'" Owen said. The newly discovered "bubbles" sit inside a region of the galaxy known to be emitting X-rays. Theorists have speculated that

this X-ray emission arises when gas that originally was part of the Virgo Cluster of galaxies, cools and falls inwards onto M87 itself, at the center of the cluster. Such "cooling flows" are commonly thought to be responsible for strong X-ray emission in many galaxy clusters.

"The new structures that we found in M87 show that the story is much more complicated," Eilek said. "What we know about radio jets suggests that the energy being pumped into this region from the galaxy's central black hole exceeds the energy being lost in the X-ray emission. This system is more like a heating flow than a cooling flow. We're going to have to revise our ideas about the physics of what's going on in regions like this."

M87, discovered by the French astronomer Charles Messier in 1781, is the strongest radio-emitting object in the constellation Virgo. Its jet was described by Lick Observatory astronomer Heber Curtis in 1918 as

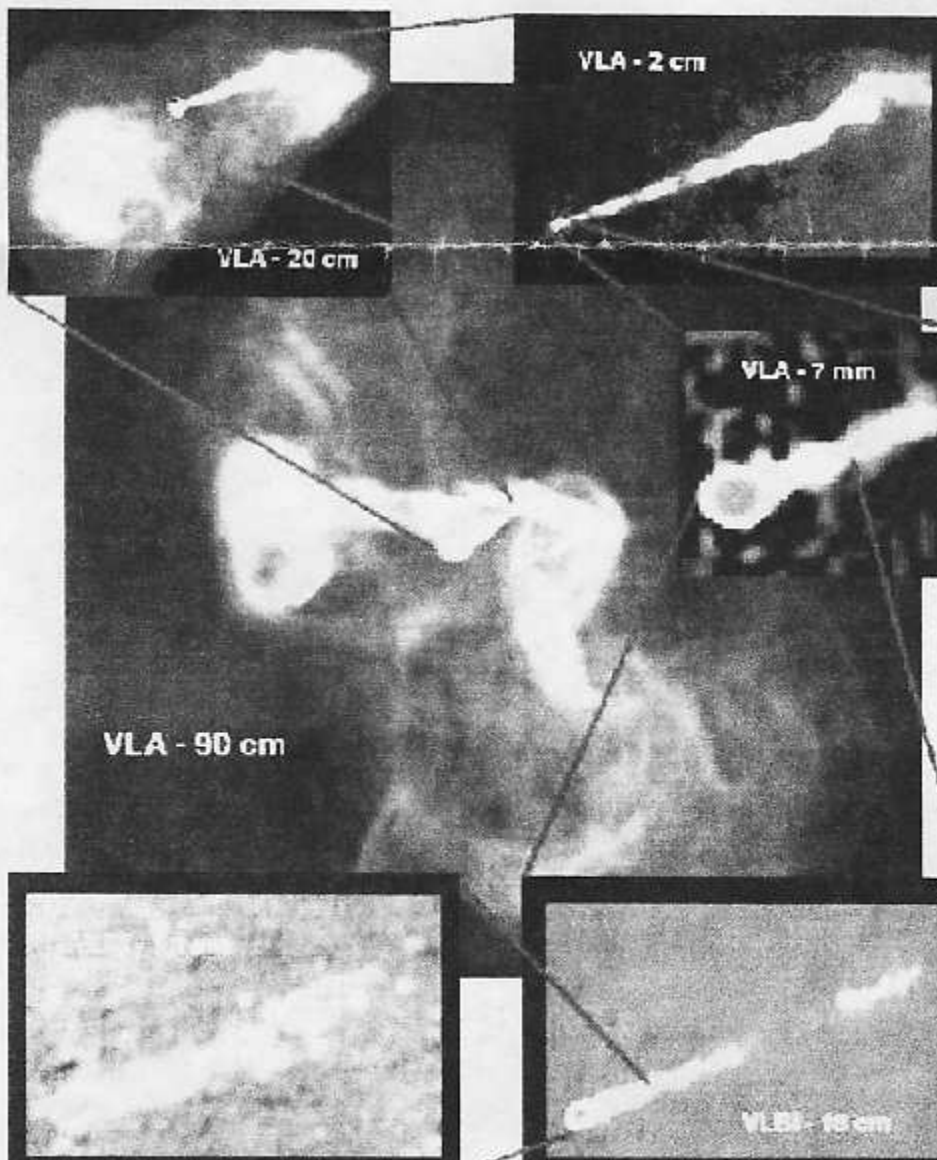
"a curious straight ray ... apparently connected with the nucleus by a thin line of matter." In 1954, Walter Baade reported that the jet's light is strongly polarized. M87's X-ray emission was discovered in 1966. M87 is the largest of the thousands of galaxies in the Virgo Cluster. The Local Group of galaxies, of which our own Milky Way is one, is part of the Virgo Cluster's outskirts.

The galaxy's radio emissions first were observed by Australian astronomers in 1947, but the radio telescopes of that time were unable to discern much detail. They could, however, show that there is a structure more than 100,000 light-years across. Subsequent radio images, particularly those made using the sharp radio "vision" of the VLA, were primarily aimed at studying the inner 10,000 light-years or so, and showed great detail in the galaxy's jet. Astronomers even have followed the motions of concentrations of material within the jet over time. These observations, however, did not show much about the larger structure that was seen by earlier radio astronomers, leaving its details largely a mystery.

Radio Images of M87 at Vastly Different Size Scales

The mystery was solved by using the VLA to observe at longer radio wavelengths, thus revealing larger-scale structures. The processing speeds of modern computers and recently-developed imaging techniques also were necessary to show the exquisite details seen in the newest VLA image of M87. The result was spectacular. "Not only did we see beautiful details that we hadn't seen before, but we also got a new and more complicated idea of the physics of this region," Owen said.

"The theories about cooling flows offered an explanation for the X-ray emission in galaxy clusters, but critics contended that other evidence we should see for this infalling matter, such as new stars forming in the denser parts of the flows, was absent," Owen said. "Now, in this case, we see that the inward flow can be counterbalanced by the energy coming outward from the galaxy's core, so the material may not be-



come dense enough to trigger star formation."

The National Radio Astronomy Observatory is a facility of the National Science Foundation, operated under cooperative agreement by Associated Universities, Inc.

The Large and Small of M87

Credit: F. N. Owen (NRAO) et al., VLA, NRAO, AUI

Explanation: The small core of elliptical galaxy M87 appears to be energizing its whole galactic neighborhood. Recent images from the Very Large Array (VLA) of radio telescopes indicate that huge bubbles of hot gas not only exist but are still being created. These bubbles measure 200,000 light-years across and surround the entire galaxy. The source creating and feeding the bubbles has been traced to jets pointing back to M87's center, where a supermassive black hole is thought to live. The smallest scale on the above radio-map is 0.2 light-years and imaged by many radio telescopes working together (VLBI). The labeled numbers refer to the wavelength of the radio waves observed. The exact composition of these jets is not known, but thought to contain various subatomic particles.

SOME THINGS NEVER CHANGE

Submitted by Roberta DeMott Friberg
from RootsWeb Review

While browsing through material in the recesses of the Roman Section of the British Museum, a researcher came across a tattered bit of parchment. After some effort he translated and found it was a letter from a man called Plutonium with the title of "magister factorium," or keeper of the calendar, to one Cassius. It was dated, strangely enough, 2 BC, December 3 -- about 2000 years ago. The text of the message follows:

Subject: Y-zero-K Problem

Dear Cassius:

Are you still working on the Y zero K problem? The change from BC to AD is giving us a lot of headaches and we haven't much time left. I don't know how people will cope with working the wrong way around. Having been working happily downward forever, now we have to start thinking upward. You would think that someone would have thought of it earlier and not left it to us to sort it all out at the last minute.

I spoke to Caesar the other evening. He was livid that Julius hadn't done something about it when he was sorting out the calendar. He is dragging his feet on this YZK problem. He said he could see why Brutus had turned nasty. We called in Consultus, but he simply said that continuing downwards using minus BC won't work and as usual, the consultants charged a fortune for doing nothing useful. Surely we will not have to throw out all our hardware and start over again? Microhard will make yet another fortune out to this I suppose.

As for myself, I just can't see the sand in the hourglass flowing upward. We have heard that there are three wise men in the East who have been working on the problem, but unfortunately they won't arrive until its all over.

I have heard that there are plans to stable all horses at midnight at the turn of the year as there are fears that they will stop and try to run backwards, causing immense damage to chariots and possible loss of life.

Some say the world will cease to exist at the moment of transition. We're continuing to work on the Y zero K problem and I'll send you a parchment if anything develops.

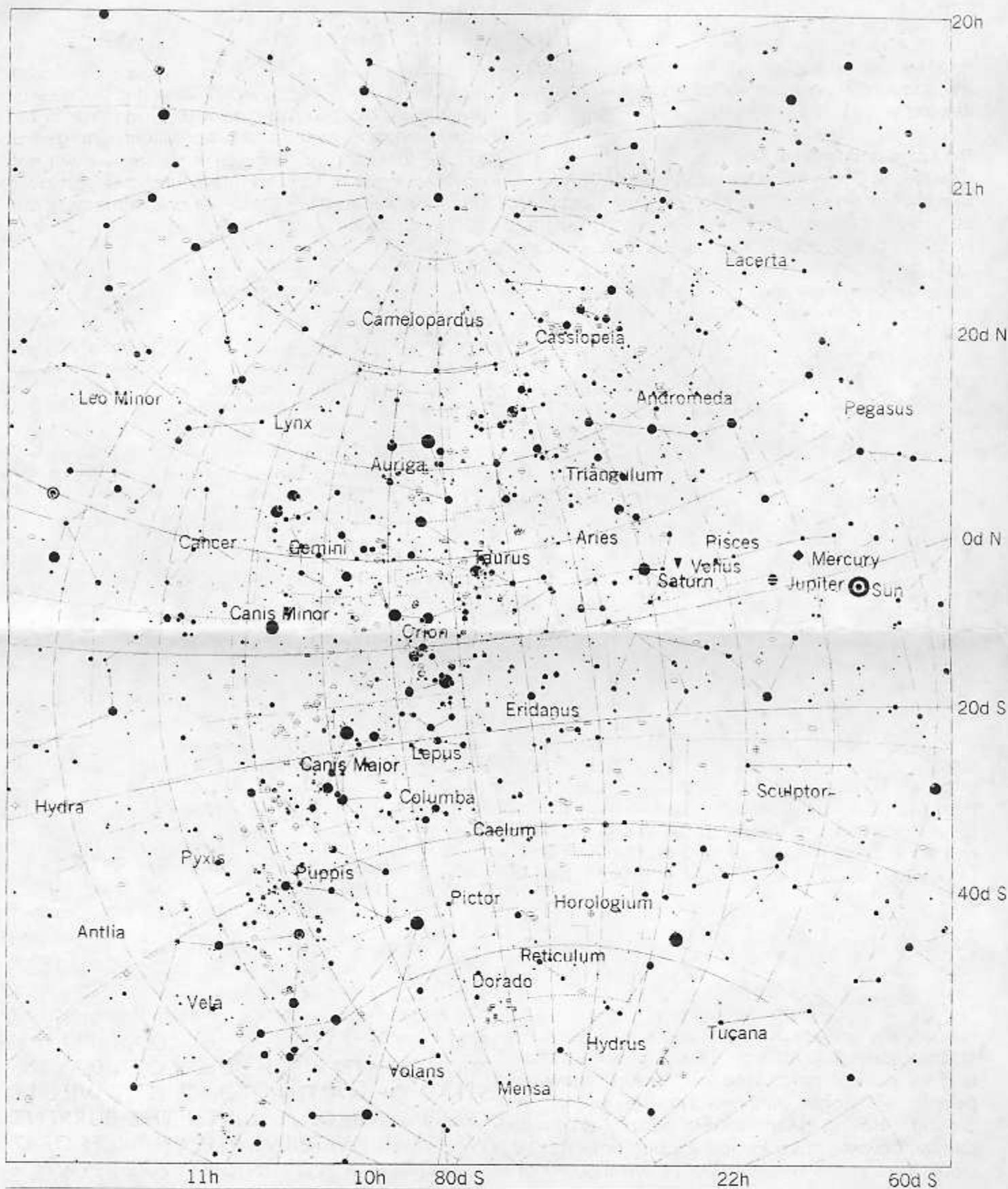
Best regards

Plutonium

MESSIER MARATHON THIS WEEKEND

FROM: DOUG SCOBEL
TO: LOWBROW.ASTRONOMERS@THE.
TELESCOPES/HOPEFULLY

JUST A REMINDER THAT THE MESSIER MARATHON IS SCHEDULED FOR THIS SATURDAY NIGHT, MARCH 13, AT LAKE HUDSON STATE PARK. I WOULD LIKE TO SUGGEST THAT IF IT IS CLEAR FRIDAY NIGHT, THEN WE SHOULD GO FRIDAY INSTEAD OF WAITING TO SEE IF IT WILL BE CLEAR SATURDAY. GIVEN THE CURRENT WEATHER PATTERNS, THE CHANCES OF IT BEING CLEAR BOTH NIGHTS ARE BETWEEN SLIM AND NONE, AND I THINK SLIM JUST LEFT. AGREED?



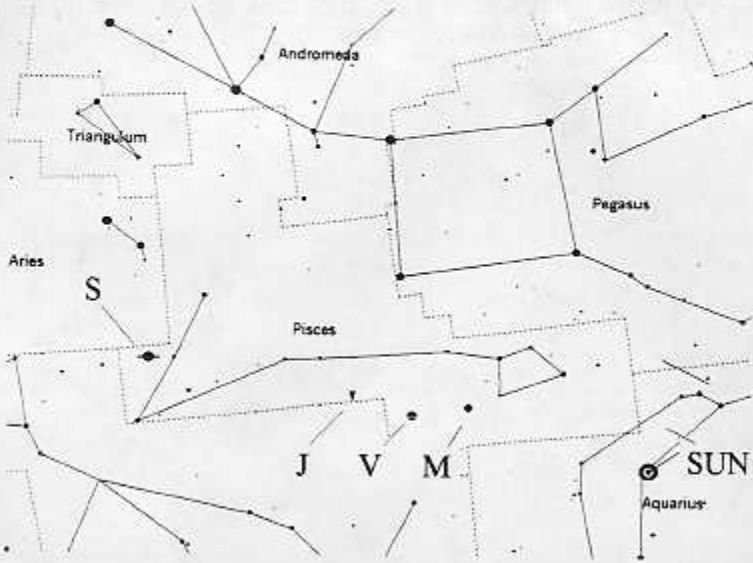
○ Variable Star	⊙ Double Star	☉ Galaxy	☁ Nebula	♁ Planetary Neb.
⊕ Open Cluster	⊛ Globular Cluster	☄ Cluster+Nebula	⊙ Prob. Star	⊛ Other NGC Objects

Center RA: 4h 31m Dec: 12d 25m N

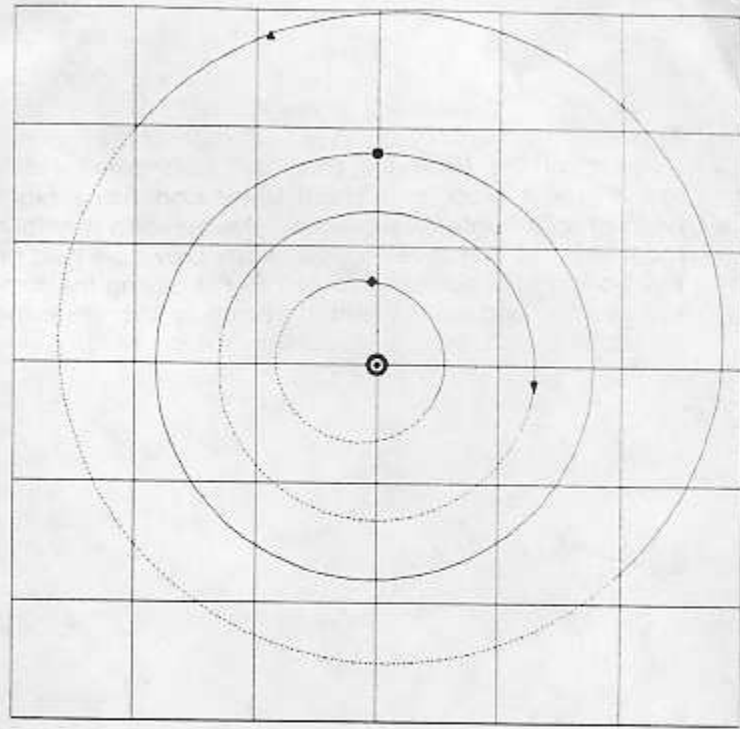
FAQS (Frequently Asked Questions)
by Bernard Friberg

(1) Q: What are the orbital positions of the planets during the month of March.

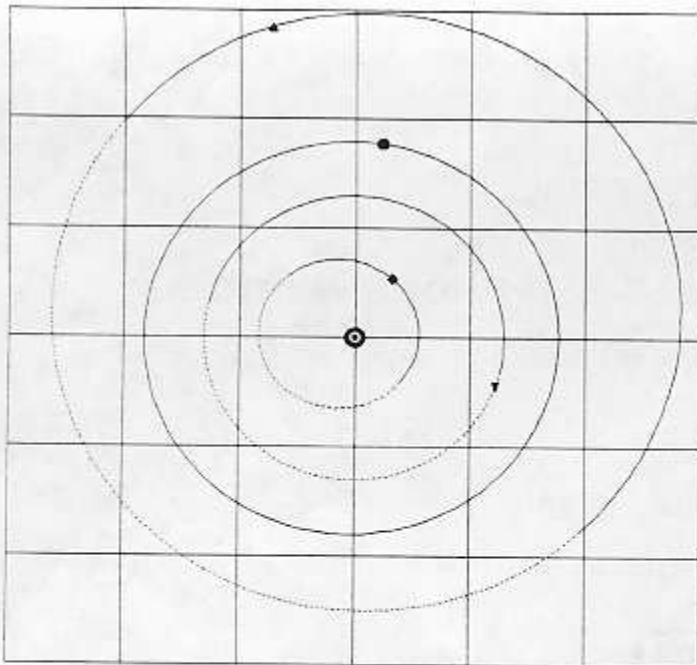
(1) A: The following charts shows the positions of the planets in the sky and also the orbital positions.



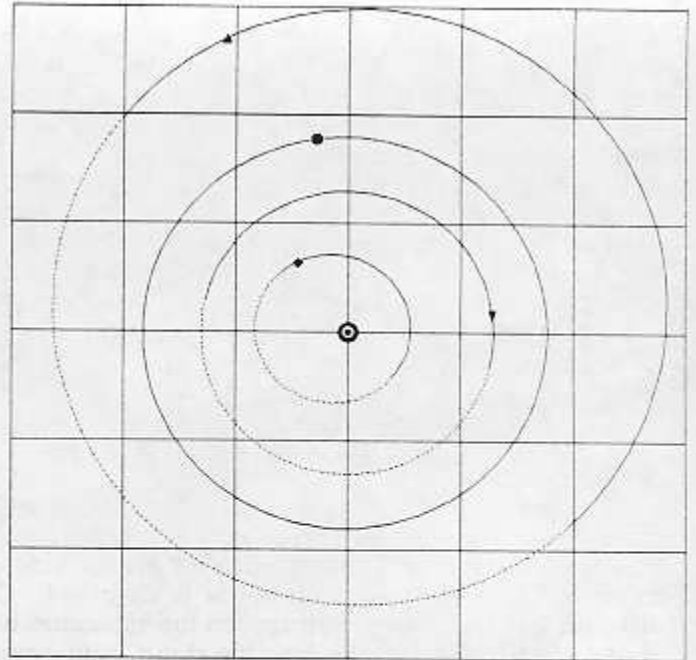
SATURN, JUPITER, VENUS, and MERCURY ON 3/1/1999



Orbital positions for Mercury, Venus, Earth and Mars on 3/20/1999



Orbital positions for Mercury, Venus, Earth and Mars on 3/1/1999



Orbital positions for Mercury, Venus, Earth and Mars on 3/31/1999



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: \$27 / year

Odyssey: \$16.95 / 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 Samecki (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:

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Vice Presidents: Lorna Simmons (734)525-5731

Dave Synder (734)747-6537

Paul Walkowski (734)662-0145

Treasurer: Doug Scobel (734)429-4954

Observatory Director: Bernard Friberg (734)761-1875

Newsletter Editors: Chris Samecki (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/>

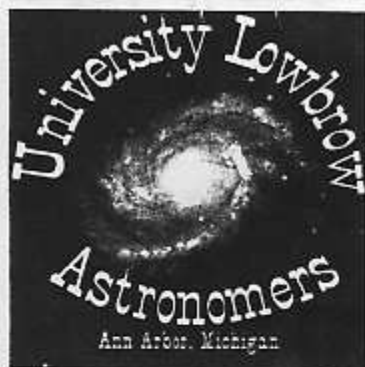
Monthly Meeting
March 19, 1999, 7:30 pm
Room 807 Dennison Hall
Physics & Astronomy Building
The University of Michigan

The Mars Society
Ann Arbor Chapter
Presents

Why Explore Mars



Credits: David Crisp and the WFPC2 Science Team (Jet Propulsion Laboratory/California Institute of Technology), and NASA. The sharpest view of Mars ever taken from Earth was obtained by the recently refurbished NASA Hubble Space Telescope (HST). This stunning portrait was taken with the HST Wide Field Planetary Camera-2 (WFPC2) on March 10, 1997, just before Mars opposition, when the red planet made one of its closest passes to the Earth (about 60 million miles or 100 million km).



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Lowbrow's WWW Home Page:
www.astro.lsa.umich.edu/lowbrows.html

Check your membership expiration date on the mailing label!

