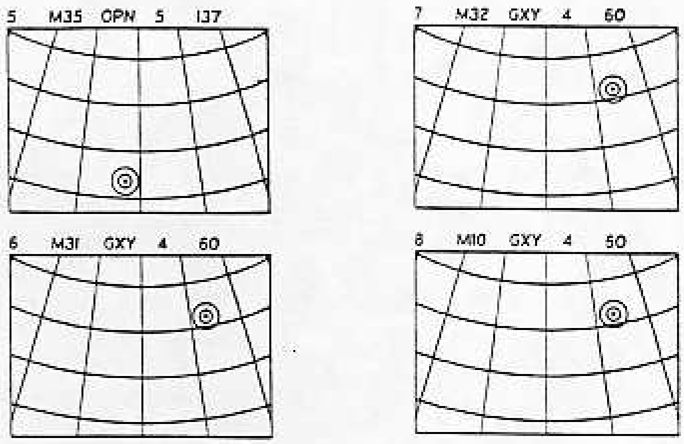
REFLECTIONS



February 1996

Road maps for ET ? Perhaps not. Doug Scobel's artical on finder charts for Messier objects explains it all inside this issue of *REFLECTIONS.*

Chris Sarnecki
Editor

Of the University Lowbrow Astronomers

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 club officers listed at the end of the newsletter.

This Month:

February 16 - Meeting at 807 Dennison Brian Ottum will speak on "How I Built My Own Observatory".

February 17 - Public Star Party at Peach Mountain Observatory The annual meeting of the Polar Bear Closet Astronomers Society out at the Peach. Bring your Woolies !

February 18 - New Moon at 11:30 pm EST

February 24 - Public Star Party at Peach Mountain Observatory The Winter sky is fast fading. Coma-Virgo is just around the corner.

Next Month:

March ? - Computer Subgroup Meeting. Subject, date, and time to be determined.

March 15 - Meeting at 807 Dennison Speaker/topic under investigation.

March 16 - Public Star Party at Peach Mountain Observatory A 4th magnitude comet is expected at -13 degrees DEC out at the Peach and I don't mean Hale-Bopp.

March 19- New Moon at 5:45 am EST

March 23 - Public Star Party at Peach Mountain Observatory A 2nd magnitude comet is expected right on the ecliptic ! Can't wait to see it.

Comet Hyakutake. (C/1996 B2) is big news on the comet circuit. It seems this object will reach naked eye visibility in late March [perhaps up stagging Comet Hale-Bopp]. An ephemeris is found inside this issue.

Messier Marathon, March 16th - If you have not been out observing this Winter it's time to dust off you scope and start studying the charts to prepare for the once a year Messier Marathon. Once again this event will be held at Lake Hudson Recreation Area. A map can be found inside to help locate the site west of Adrian, MI.

BRIGHT New Comet !

[The following was E-mailed from Wes Boyd, Newsletter Editor of StarQuest Newsletter, Amateur Astronomy in Lenawee, Jackson, and Hillsdale Counties, Michigan, and Steuben County , Indiana. Some of you know Wes as the promoter of Michigan's first dark sky preserve at Lake Hudson Recreational Area outside of Clayton, MI. Thanks for the info, Wes - Ed]

Great news! The following was scammed this afternoon off Fidonet's ASTRONET conference:

Area: ASTRONET
Date: 05 Feb 96 11:45:00 Public
From: Jim Meadows
To: All
Subject: New Comet Hyakutake

IAU Circular 6304 reports a new comet discovered on January 30th by Amateur Astronomer Yuji Hyakutake of Kagoshima, Japan using 25x150mm binoculars. He reported it was magnitude 11 and was a fuzzy object 2.5 minutes of arc across. According to Brian Marsden's preliminary parabolic orbit, Comet Hyakutake (C/1996 B2) is expected to pass just 10 million miles from the Earth on March 26th. At that time it will be a very bright naked-eye object in the sky, and northern hemisphere observers will have a ringside seat to watch it speed past the Earth. It will fade as it moves away from the Earth, but will brighten again as it approaches the Sun. The comet will pass within 20 million miles of the Sun on April 26th it will be very bright but so close to the Sun that you will probably need a telescope to see it.

Throughout February Comet Hyakutake rises about midnight low in the southeast just west of Libra and is best seen just before dawn. It moves very little but gradually brightens to about 7th magnitude by the end of the month. Then it will brighten very rapidly and move swiftly northward as it speeds past the Earth, reaching naked-eye brightness by mid-March. The comet will pass through Bootes between March 17 and March 25th, it will then pass by the 'cup' of the Little Dipper between March 26 and 28th, and then move into Perseus. It will be a circumpolar object for most of the U.S. during closest approach. At its brightest on March 26th it will be near and possibly brighter than Polaris.

An ephemeris produced by Dave Lane:

Comet C/1996 B2 (IAUC 6303)

YYYY/MM/DD	RA & Dec (2000)		Mag	D-Ear	D-Sun
1996/02/03	14h33m51.0s	-24d56'24"	9.74	1.76	2.01
1996/02/05	14h35m24.6s	-24d56'02"	9.59	1.69	1.97
1996/02/07	14h36m56.5s	-24d54'51"	9.43	1.62	1.94
1996/02/09	14h38m26.6s	-24d52'47"	9.27	1.56	1.91
1996/02/11	14h39m54.5s	-24d49'42"	9.09	1.49	1.87
1996/02/13	14h41m20.3s	-24d45'27"	8.92	1.42	1.84
1996/02/15	14h42m43.6s	-24d39'54"	8.73	1.36	1.81
1996/02/17	14h44m04.3s	-24d32'51"	8.54	1.29	1.77
1996/02/19	14h45m22.0s	-24d24'04"	8.34	1.22	1.74
1996/02/21	14h46m36.6s	-24d13'15"	8.13	1.16	1.70
1996/02/23	14h47m47.9s	-24d00'05"	7.91	1.09	1.67
1996/02/25	14h48m55.4s	-23d44'06"	7.68	1.02	1.63
1996/02/27	14h49m58.8s	-23d24'47"	7.44	0.95	1.60
1996/02/29	14h50m57.8s	-23d01'24"	7.18	0.89	1.56
1996/03/02	14h51m51.9s	-22d33'02"	6.91	0.82	1.53
1996/03/04	14h52m40.4s	-21d58'26"	6.62	0.76	1.49
1996/03/06	14h53m22.5s	-21d15'55"	6.31	0.69	1.45
1996/03/08	14h53m57.0s	-20d23'04"	5.98	0.62	1.42
1996/03/10	14h54m22.6s	-19d16'25"	5.62	0.56	1.38
1996/03/12	14h54m36.9s	-17d50'40"	5.23	0.49	1.34
1996/03/14	14h54m36.6s	-15d57'30"	4.80	0.43	1.30
1996/03/16	14h54m16.4s	-13d23'01"	4.32	0.36	1.26
1996/03/18	14h53m27.5s	-09d42'26"	3.77	0.30	1.22
1996/03/20	14h51m52.6s	-04d07'55"	3.14	0.24	1.18
1996/03/22	14h48m54.4s	+05d00'33"	2.41	0.18	1.14
1996/03/24	14h42m50.0s	+21d14'40"	1.60	0.14	1.10
1996/03/26	14h26m37.9s	+49d13'24"	0.95	0.11	1.06
1996/03/28	12h28m17.8s	+80d59'13"	0.93	0.12	1.02
1996/03/30	04h05m51.6s	+73d47'23"	1.35	0.16	0.97
1996/04/01	03h30m45.3s	+61d33'50"	1.77	0.21	0.93
1996/04/03	03h20m39.2s	+54d15'27"	2.09	0.27	0.89
1996/04/05	03h15m35.0s	+49d31'56"	2.31	0.33	0.84
1996/04/07	03h12m15.7s	+46d13'29"	2.45	0.39	0.80
1996/04/09	03h09m40.0s	+43d44'57"	2.51	0.45	0.75
1996/04/11	03h07m22.4s	+41d47'10"	2.51	0.51	0.70
1996/04/13	03h05m09.4s	+40d08'42"	2.46	0.58	0.65
1996/04/15	03h02m52.9s	+38d42'07"	2.35	0.64	0.60
1996/04/17	03h00m27.1s	+37d22'09"	2.18	0.71	0.55
1996/04/19	02h57m47.3s	+36d04'35"	1.95	0.77	0.50
1996/04/21	02h54m49.2s	+34d45'32"	1.66	0.84	0.45

From JPL's comet home page:
(http://www.encke.jpl.nasa.gov)

C/1996 B2 (Hyakutake) - IAU Circular 6299 (January 31, 1996) reported the visual discovery of a comet by Yuji Hyakutake (Hayato-machi, Aira-gun, Kagoshima-ken, Japan) using 25x150 binoculars. At discovery, the comet was about 10th magnitude, 4' in diameter and moderately condensed.

WHAT TO EXPECT... - A preliminary orbit for this comet (IAUC 6303, February 3, 1996) indicates that it may become a very bright object in March, April, and May of this year. The ephemeris is given on the ephemeris page. The perihelion distance of this comet is only 0.22 AU. Perihelion will occur on May 2. However, the comet will also make a close approach to the Earth (0.11 AU) on March 26. The Northern Hemisphere is favored preperhelion, particularly in late March when the comet will be circumpolar reaching +80 degrees. The comet may be 1st magnitude at that time! However, the comet will probably be a degree or more in diameter. The tail may well be poorly developed so the comet will most likely look like a low-surface brightness fuzz ball to the naked eye (remember IRAS-Araki-Alcock in 1983?). During this time, the comet will move from the morning into the evening sky.

As the comet approaches perihelion, it will become more condensed - that is, it will look more star-like. How spectacular the comet appears will depend on both the brightness of the coma and the amount of dust the comet generates. The human eye is most sensitive to the reflected light from the dust. For a bright tail to be obvious, the comet must produce a lot of dust. Remember P/Halley in 1986? Halley's dust tail was relatively faint and most general observers were disappointed. At perihelion, the tail will be greatly foreshortened because it will be pointing away from us. The
Moon, which will be full at the time of perihelion (although in the opposite part of the sky), will hinder observations.

Postperihelion is totally a Southern Hemisphere event. The tail development will likely reach a maximum a month or so after perihelion. The foreshortening of the tail will become less of a problem toward the end of May. These two effects should result in a rapid lengthening of the tail. The downside for the Southern Hemisphere observers is that the comet will rapidly fade. It is likely to be lost as a naked eye object in early June.

How bright the comet actually becomes will depend on its rate of brightening. Many observers will remember Comet Austin in 1990, which was suppose to reach 0 magnitude and only made it to 4.5. I believe that the peak brightness will be between magnitude +1 and +2 in late March and -0.5 to 3.0 at perihelion. We will know more by the end of February.

It's All-Nighter Time!

by Doug Scobel

Next month, March, should bring only one thing to mind for any self respecting deep sky observer - MESSIER MARATHON ! Yes, late March and early April is the only time of the year when you can view all of the 100+ Messier objects in a single night. The reason this is possible is that the Messier objects are not distributed evenly across the sky. There is a "gap" from about right ascension 22 hours to 0 hours where there are none. (Actually, M52, an open cluster in Cassiopeia, is in the "gap", but is far enough north that it can still be seen in a dark sky.) When the Sun is in this void, in late March, all the objects are available from dusk to dawn. So, to do a Messier Marathon, you start in the west at dusk, and work your way eastward all night until dawn, observing as many Messier objects as you can.

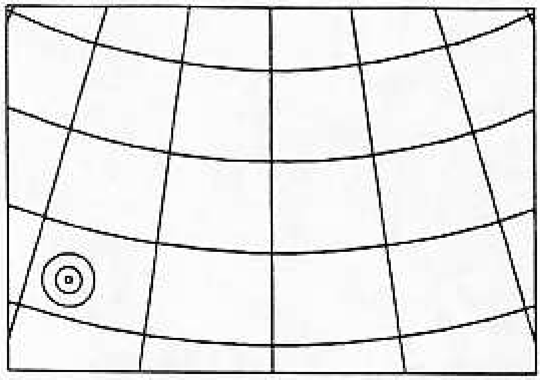
The challenge is to observe them all. To do this, you need to know the proper search sequence, especially during late dusk and early dawn when the sky is not completely dark due to twilight. So, you have to do some careful planning beforehand if you want to run a successful Messier Marathon. There are a number of handbooks available to help you do this. Probably the best one is "Messier Marathon Observer's Guide, Handbook and Atlas" by the veteran comet hunter Don Machholz. It contains all the information you'll ever need for your all-nighter, including some really useful finder charts.

If you're smart, you'll buy one of these books. But, if you're cheap (like me) then all you have is an article from a back issue of either *Astronomy* or *Sky and Telescope* magazine. They contain good articles that let you know the proper search sequence for each object, but the so-called finder chart is simply a map of the entire sky, reduced to fit on an 8 1/2 by 11 inch page. So, unless you're REALLY familiar with where all the Messier objects are in your sky atlas, you'll have to look them up one by one while you go along. This will take long enough, but then you'll have to spend even more time looking for the object on the chart before you even begin to look skyward. If only you could know immediately what star chart to look at, and where on the chart the object is. Well, I've come up with a way of doing just that.

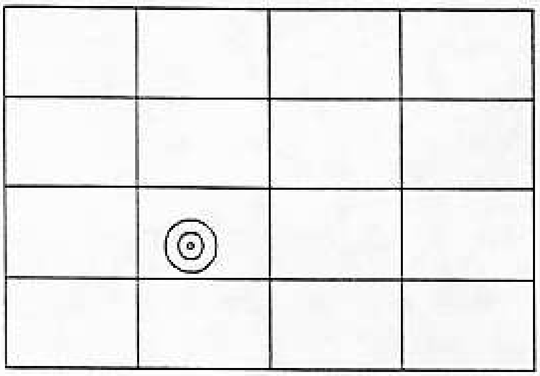
My solution was to draw up a series of finder charts, one per Messier object, that shows where the object appears on the real chart. Since I use Sky Atlas 2000, those are the charts I reproduced.

Here is what I came up with:

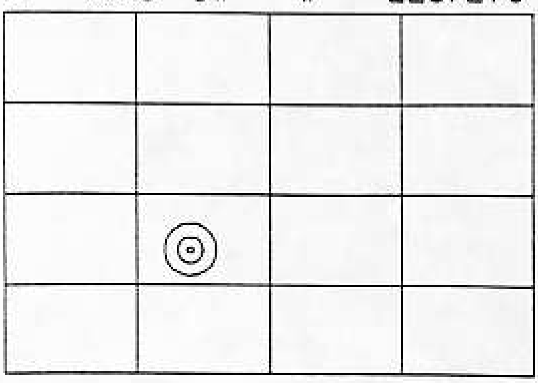
1 M45 OPN 4 132



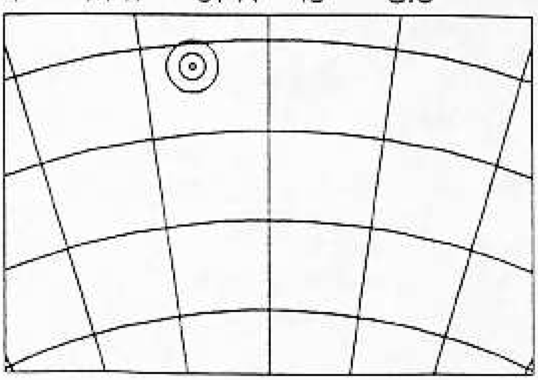
2 M42 DIF 11 225/270



3 M43 DIF 11 225/270



4 M41 OPN 19 318



Each page contains a series of facsimile star charts, one per Messier object. Across the top of each miniature chart is the object's search sequence number, Messier catalog number, type of object, Sky Atlas 2000 chart number, and Uranometria 2000 chart number(s). A bulls-eye shows the object's approximate location on the chart. I have the charts arranged eight to a page, all in the proper search sequence. To use the charts, all I have to do is start with the first object, open up my Sky Atlas 2000 to the indicated chart, use the bulls-eye to find the object on the chart, and in maybe ten seconds I can start star-hopping with the telescope. To find the next object, all it takes is another five or ten seconds and I'm ready to start star-hopping again. Also, I made the chart for each object large enough so that I can jot down notes (such as success/failure in finding it, time observed, etc.) for each object.

Sounds easy, huh? I wish I could say for sure that they work, but we got clouded out last year and I never had a chance to try them. For at least the third consecutive year, the Astronomical Society of Hillsdale and Lenawee Counties will be hosting a Messier Marathon this March at Lake Hudson state park (see the announcement elsewhere in this newsletter). I know that Chris Sarnecki, myself, and possibly other Lowbrows are planning on being there. This year the weather will cooperate, right?

If you think you might be able to make use of my charts, just let me know and I can make a copy of them for you. Also, the March 1994 issue of *Astronomy* magazine (which I have) has an excellent article on doing a Messier Marathon. You're more than welcome to borrow it as well.

Hope to see you out there!

[Lake Hudson is an excellent dark site and is much darker than Peach Mountain. Feel free to contact Doug or myself if you are interested in going. We will give you the specifics. On the adjacent page is a map locating Lake Hudson - Ed]

Astronomical Societies of
Lenawee and Hillsdale Counties
c/o Wes Boyd, 14815 Rome Rd.
Manitou Beach, MI, 49253
(517) 547-7402 eves; (517) 448-2611 weekdays

The Astronomical Societies of Hillsdale and Lenawee Counties will sponsor their

Fifth Annual Messier Night

Saturday, March 16

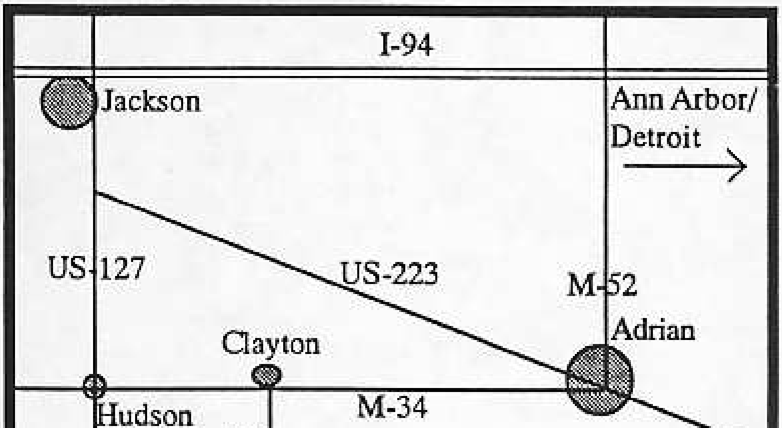
at Lake Hudson State Recreation Area beach, Clayton, Michigan

Doing a "Messier Marathon" is a great way to sharpen observing skills and get ready for spring observing! We're inviting people from around the tri-state area to join us for a night of great observing (assuming the weather permits, of course). If you're interested in doing a "Messier Marathon", or just want to spend the night checking out some dark skies, this is the time. Lake Hudson has one of the darkest locations, free from ground lighting, with relatively clear horizons, that we've been able to find in a lot of looking around the tri-state area, and in 1993 was named the state's first Dark Sky Preserve. We'd like to invite our friends and fellow enthusiasts to join us.

If we get weathered out on March 16, the backup Messier night will be Saturday, April 20. Call Wes Boyd at (517) 547-7402 eves or (517) 448-2611 weekdays if you have questions. This isn't going to be anything elaborate; there won't be any speakers, or special activities, and **no registration fees** (we would like you to register, so we can know you were here). Please note, however, that Lake Hudson is a state recreation area, and a $3.50 per vehicle daily fee or an annual state park sticker is required. We will provide some sort of a warming shelter on the primary night, and a pot of hot coffee. There will be certificates for those spotting over 75 Messier objects, and plaques for the top two observers (if over 100 objects). There will be no 110-v power available. Bring your nebula filters, though; if the weather conditions are anything less than dead perfect, there will be some skyglow low in the east, and possibly in other directions.

The Lake Hudson entrance is located approximately 1 1/2 miles south of the village of Clayton, Michigan, on M-156; the beach is approximately 1/2 mile off of M-156. Clayton is approximately 11 miles west of Adrian, Michigan on M-34, or six miles east of Hudson, also on M-34. (Hudson is about 25 miles south of Jackson on US-127.)

If the weather permits, (and, let's face it, it's always iffy this time of year) we ought to have a great night of serious observing, and we'd like to have you give us a call at (517)-448-2611 weekdays or (517) 547-7402 evenings, right up to the last minute, if you have any questions.



Galileo Probe Mission "Quick-look" Science Summary

NASA/JPL (Date: 1/25/96) - The most difficult atmospheric entry in the solar system was successfully accomplished !

After a six year journey through the solar system and after being inexorably accelerated to a speed of 170,700 km/hour (106,000 mph) by Jupiter's tremendous gravitational pull, the Galileo Probe successfully entered Jupiter's atmosphere at 22:04 UT (2.04 pm PST) on December 7, 1995. During the first two minutes of this most difficult atmospheric entry ever attempted, temperatures twice as hot as the Sun's surface temperature and deceleration forces as great as 230 g's (230 times the acceleration of gravity at Earth's surface) were produced as the spacecraft was slowed down by Jupiter's atmosphere.

The Galileo Probe and Orbiter separated on July 13, 1995 and both arrived at Jupiter on slightly different trajectories. The Galileo Orbiter successfully became the first spacecraft to enter an orbit about Jupiter a few hours after the Probe's successful descent into the atmosphere.

The Galileo Probe's radio transmission lasted for 57.6 minutes. At a speed of 3,000 km/hour (1,900 mph), the Probe's parachutes deployed and the heat shields fell away for the start of the direct measurements of the atmosphere and the transmission of data via a radio link to the Galileo Orbiter which was 215,000 km (134,000 miles) above. The descent sequence was successfully executed, but for an as yet unknown reason, the start of the scientific measurements occurred 53 seconds late. This delay means that the direct atmospheric measurements started deeper in the atmosphere than originally planned- starting at the 0.35 bar (0.35 times sea-level atmospheric pressure on Earth) pressure level (at or below the estimated cloud tops) rather than the 0.1 bar pressure level. The Probe's transmissions to the Orbiter, which stored the data in its computer memory and on its tape recorder for later playback to Earth, lasted for 57.6 minutes, failing only after the communication system on the Probe succumbed to the extreme environmental conditions about 600 km (373 miles) after entering the tenuous upper reaches of Jupiter's atmosphere.

All the scientific instruments operated successfully. The Probe data stored in the Orbiter's computer memory has been successfully received on Earth (transmission of the more complete data on the tape recorder begins the week of January 22, 1996). Preliminary analysis of the received data indicates all scientific instruments operated properly and returned valuable measurements of the complex atmosphere of Jupiter and the innermost regions of Jupiter's intense radiation belts. Six scientific instruments and an experiment utilizing the Probe's radio transmissions to determine wind speeds collected information on the environmental conditions down to about 200 km (125 miles) below the visible cloud tops of Jupiter. The atmospheric probe did not include a camera.

Why send a Probe into Jupiter's atmosphere? Prior to Galileo's arrival, many fundamental questions about Jupiter's nature remained unanswered due to the obscuring veil of its uppermost clouds, which is what is seen when looking at Jupiter from Earth or from a passing spacecraft such as Voyager or Pioneer. Jupiter, the largest of the planets, is one of the four so-called Gas Giant Planets which are principally composed of hydrogen and helium and do not have solid surfaces like the icy and terrestrial planets, of which Earth is the largest. In addition, because of Jupiter's strong gravitational pull, the original materials which made up the cloud of gas and dust that formed the planets are believed to remain trapped on Jupiter, unlike Earth where they have largely escaped. Thus, by accurately determining the composition of Jupiter, scientists believe they can obtain a better understanding of the formation of the planets and the origin of the solar system.

A new intense radiation belt was discovered. Six hours before atmospheric entry, the Galileo Probe, which had been in a dormant state for the 155 days since its separation from the Galileo Orbiter, came to life to begin preparing for the atmospheric entry. Three hours before entry the only scientific experiment not designed for studies of the atmosphere started to take measurements. The Energetic Particle Instrument (EPI) measured the radiation (high energy charged particles) in the previously unexplored inner regions of Jupiter's magnetosphere -- the gigantic region about the planet in which the magnetic field of Jupiter dominates the interplanetary magnetic field produced by the Sun. Jupiter's magnetosphere is by far the largest in the solar system and its magnetic field and radiation belts are by far the strongest.The Earth has its own radiation belts known as the Van Allen belts. The radiation belts on Jupiter are so strong that the Galileo Orbiter is limited to maintaining an orbit quite high above Jupiter's cloud tops to avoid exposing its electronics to this damaging radiation. The EPI discovered a new intense radiation belt between Jupiter's ring and the uppermost atmospheric layers. This belt is approximately 10 times as strong as Earth's Van Allen radiation belts. A surprise discovery in this new radiation belt occurred with the finding of high energy Helium ions of unknown origin. With further analysis, these discoveries will increase our understanding of Jupiter's magnetosphere and of its high frequency radio emissions. Many bodies in the universe (stars, galaxies, pulsars, etc.) have extensive magnetic fields and trapped radiation so studying the particularly strong magnetosphere of Jupiter can provide us with new understanding the nature of these objects as well.

Measurements of temperature, pressure, and vertical winds reveal several surprises. As the plunge into Jupiter's atmosphere began, the Atmosphere Structure Instrument (ASI) started to probe the uppermost regions of the atmosphere through its influence on the probe's motion. The objective of this investigation was to measure the temperature, pressure, and density structure of Jupiter's atmosphere throughout the Probe's descent into the atmosphere. Such information is essential for understanding Jupiter's atmosphere and for interpreting the results of the other experiments. Temperature and pressure were directly measured during the parachute descent phase of the mission. Initial results include the detection of upper atmospheric densities and temperatures that are significantly higher than expected. An additional source of heating beyond sunlight appears necessary to account for this result. In the lower reaches of the atmosphere, temperatures were found to be close to the expected temperatures. The vertical variation of temperature in the 6-15 bar pressure range (about 90-140 km below visible clouds) indicates the deep atmosphere is dryer than expected and is convective. An important additional objective of the ASI was the measurement of vertical wind speeds in the lower reaches of the atmosphere. The ASI has provided evidence that the deep atmosphere is highly turbulent. The end of data transmission occurred at an atmospheric pressure of 23 bars and a temperature of 305 degrees F (152 C). These initial results of the ASI experiment have various important implications. The upward and downward winds appear to be much stronger than expected, requiring a revision of our ideas about the escape of energy from Jupiter's interior. Finally, our ideas about the abundance and distribution of water on Jupiter will need to be reconsidered.

Visibility in the atmosphere is much greater than expected in the immediate vicinity of the Probe entry site. Since we are seeing clouds when we look at Jupiter from afar, detecting and understanding the nature of its clouds can reveal a great deal about this cloud enshrouded world. The objective of the Nephelometer (NEP) instrument was to detect and characterize cloud particles in the immediate vicinity of the Probe as it descended to different levels. This objective was achieved by shining a laser beam across a short distance to a small mirror deployed just outside the Probe. By studying the scattered and transmitted light, cloud particles could be detected and characterized. This experiment has found several surprising initial results. No thick dense clouds were found, in contrast to expectations based on analysis of telescopic and flyby spacecraft observations of the planet and simple theoretical models. In fact only very small concentrations of cloud and haze materials were found along the entire descent trajectory. Only one well-defined distinct cloud structure was found, and this layer appears to correspond to a previously postulated ammonium hydrosulfide cloud layer. The observed cloud structure is very different than that expected by astronomers, and they will have to revise ideas of cloud formation on Jupiter. One important question which has arisen from these as well as other observations is whether the Probe's entry location is representative of most other regions of Jupiter.

Thick cloud detected some distance away from the Probe entry site. The variation of the amount of sunlight with depth and the variation of infrared ("thermal") radiation with depth, which were measured by the Net Flux Radiometer (NFR) experiment, can aid in the detection of cloud layers, the understanding of the power sources for the winds, and the detection of water vapor. On a clear day on Earth the brightness of the sky is quite bright in the direction of the sun and less bright in other directions. On a very cloudy day, the sky is nearly equally bright in all directions and determining the direction to the sun can be difficult. The Net Flux Radiometer instrument has used this effect along with the Probe's spin to locate an important cloud layer on Jupiter. Large variations in the brightness of the sky in different directions were noticed until an abrupt drop-off in the variation occurred below a pressure level of 0.6 bars, indicating a cloud layer which is most likely the previously postulated ammonia cloud layer-- believed to correspond to the uppermost cloud layer on Jupiter. No other significant cloud layers were found-- in particular the tenuous cloud layer detected by the NEP was not seen by this experiment. Moreover, the cloud seen by the NFR was not seen by NEP. This apparent contradiction can be understood by noting that the NEP measures cloud particles in the immediate vicinity of the Probe while the NFR measures clouds over a long distance. The simplest explanation for the results from these two cloud-detecting experiments appears to be that the clouds are patchy and that the Probe went through a relatively clear area. Heating of the NFR's cloud layer by heat escaping from the interior of Jupiter appears to also be occurring and may affect the nature of Jupiter's winds. Once again the cloud structure at the Probe entry site appears to be very different than expected for Jupiter. Models of cloud formation on Jupiter must be revised.

Strong winds persist to great depth: Previous studies of

Jupiter's cloud motions show that it has a very unusual wind system consisting of strong alternating east-west jet streams quite unlike Earth's wind systems. The origin of Jupiter's winds is not clear, in large part due to our inability to see below the uppermost clouds in the atmosphere. The Doppler Wind Experiment used changes in the frequency of the radio signal from the Probe due to its motion (called the Doppler effect, this phenomenon can also be observed by listening to the changing pitch of a train whistle as the train goes by) to evaluate the vertical variation of winds in the atmosphere, thus providing a key clue to understanding the origin of the winds. Initial results from this experiment indicate that the winds below the clouds are 540 km/hour (330 mph) and roughly independent of depth. These results have profound implications. One implication of this result is that winds on Jupiter do not appear to be produced by heating due to sunlight or by heating due to condensation of water vapor-- two heat sources which power winds on Earth. A likely mechanism for powering the winds now appears to be the heat escaping from Jupiter's deep interior.

Lightning activity on Jupiter very different than on Earth: Lightning activity in an atmosphere can provide evidence of thunderstorm-like activity which would be indicative of regions of strong atmospheric updrafts and regions of precipitation. Production of certain chemical species, including organic molecules such as those that are the building blocks of life on Earth, can also depend on the amount of lightning activity. On Earth we are accustomed to lightning discharges between the clouds and the ground. However, lightning discharges between clouds are quite common as well. On Jupiter, where no solid surface exists, lightning is expected to be of the cloud-to-cloud variety. The Lightning and Radio Emission Detector searched for optical flashes and radio waves emitted by lightning discharges. No optical lightning flashes were observed in the vicinity of the Galileo Probe. Many discharges were observed at radio frequencies. The form of the radio signals indicates discharges are far away (roughly one Earth diameter away), and the lightning bolts are much stronger than Earth's. Radio wave intensity suggests the lightning activity is 3-10 times less than on Earth. Therefore, the initial analysis implies that lightning activity on Jupiter is very different than on Earth. The unusual form of the radio signals from lightning indicates more work on lightning discharge physics on Jupiter is needed. Ideas of water cloud distribution and heat escape from Jupiter may need revision.

Several key elements and compounds appear to be less abundant than expected: For the reasons stated earlier, the accurate determination of Jupiter's composition can not only have implications for understanding Jupiter today but can also provide clues to the planetary formation and evolution process. The Neutral Mass Spectrometer (NMS) experiment's objective was to accurately determine the composition of the atmosphere. Initial results indicate the atmosphere has less water than expected. The atmosphere appears to have less than expected carbon in the form of methane gas. Also, slightly less sulfur than expected in the form of hydrogen sulfide appears to be present. Noble ("inert") gas concentrations differ from expectations as well, including a notable depletion of the gas Neon. Little evidence for organic molecules was found. The Helium Abundance Detector experiment very accurately measured the abundance of Helium. The abundance of Helium was found to be significantly less than that in the Sun. These results suggest our ideas about the formation and evolution of Jupiter must be revised. In particular, fractionation or "raining out" of Helium appears to have occurred in the atmosphere. The role of local meteorology in producing the dryer atmosphere must also be considered.

The Probe apparently entered a rather special location on a quite nonuniform world. Groundbased telescopic observations were undertaken to determine the appearance of the Galileo Probe entry site (6.5 degrees North Latitude and 4.5 degrees West Longitude) at the time of entry and to determine the variability of this location on the planet. An important goal of these observations was to place the Galileo Probe results in the context of Jupiter as a whole. Initial results indicate the entry site is a quite variable region. The Probe entered Jupiter near the edge of a so-called infrared "hot spot" believed to be a region of reduced clouds. The results imply that the Galileo Probe apparently entered a rather unique location on this highly heterogeneous planet. This uniqueness may account for the many apparent surprises found by the Probe during its descent.

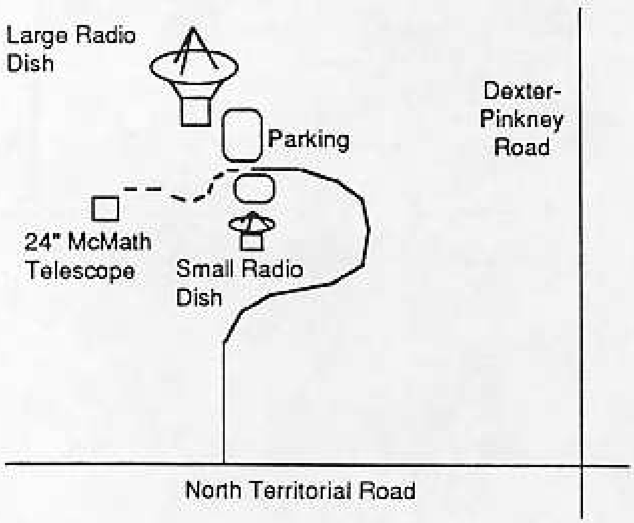
There are more results to come! This summary of scientific findings from the Galileo Probe mission is the result of a quick analysis of the returned data and thus these results should be viewed as preliminary. The process of converting the data returned from the Galileo Probe into useful physical scientific measurements requires time and careful analysis. Much additional work needs to be done in the coming months and years to refine and expand upon this initial work.

The Galileo Probe Project is managed by NASA's Ames Research Center, Mountain View, CA. Hughes Space and Communications built the Galileo Probe spacecraft. NASA's Jet Propulsion Laboratory, Pasadena, CA built the Galileo Orbiter spacecraft and manages the overall mission.

Places:

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.

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.



Times:

Monthly meetings of the Lowbrows are held on the 3rd Friday of each month at 7:30 PM in 807 Dennison Hall. During the summer months, and when weather permits, a club observing session at Peach Mountain will follow the meeting.

Computer subgroup meetings are held on the first of each month, rotating among member's houses. See the calendar on the cover page for the location of next meeting.

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 mosquitos - bring insect repellent, and it does get cold at night so dress warmly !

Dues:

Membership dues in the University Lowbrow Astronomers are $20 per year for individuals or families, and $12 per year for students. 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 either at the monthly meeting or by mail at:
Doug Scobel
1426 Wedgewood Drive
Saline, MI 48176

Magazines:

Members of the University Lowbrow Astronomers can get a discount on these magazine subscriptions:
Sky and Telescope: $24 / year
Astronomy: $20 / 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.

Newsletter Contributions:

Members and (non-members) are encouraged to write about any astronomy related topic of interest. Call the Newsletter Editor Chris Sarnecki at 426-5772 or e-mail to chrisandi@aol.com to discuss length and format. Announcements and articles are due by the first Friday of each month. Articles should be mailed to:
Christopher Sarnecki
4835 Holly Way
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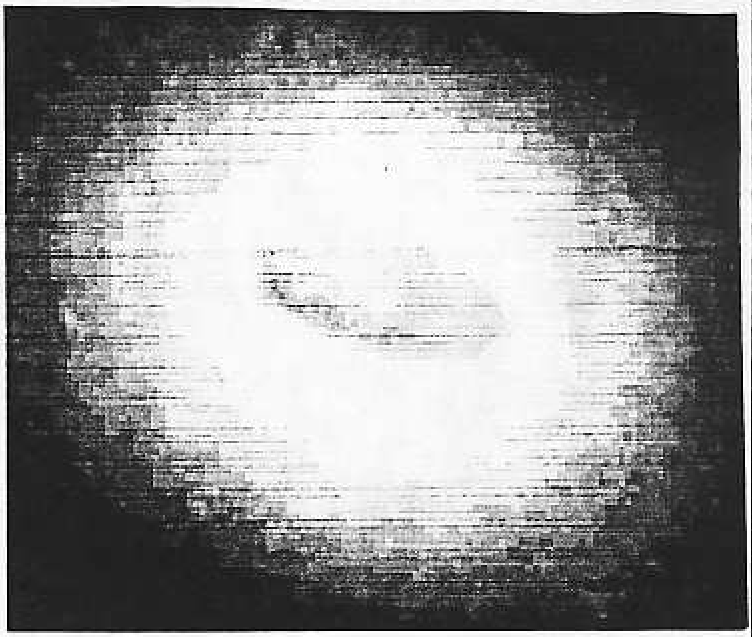
Treasurer:	Doug Scobel	429-4954
Observatory Director:	Bernard Friberg	761-1875
Newsletter:	Chris Sarnecki	426-5772
Peach Mtn Keyholder:	Fred Schebor	426-2363

MONTHLY MEETING:

The Lowbrow's Own:

Brian Ottum will speak on "How I Built My Own Observatory"

The meeting starts at 7:30 pm, Friday, February 16th in Room 807 of Dennison Hall (Physics & Astronomy Building)



The spiral galaxy NGC 4261 in Virgo, 12h 19.4 m RA, 5d 49 m DEC, 3.9 arcmin, 10.3 mag, pB, pS, R, gbM

University Lowbrow Astronomers
1740 David Ct.
Ann Arbor, MI 48105

Check your membership expiration date on the mailing label !