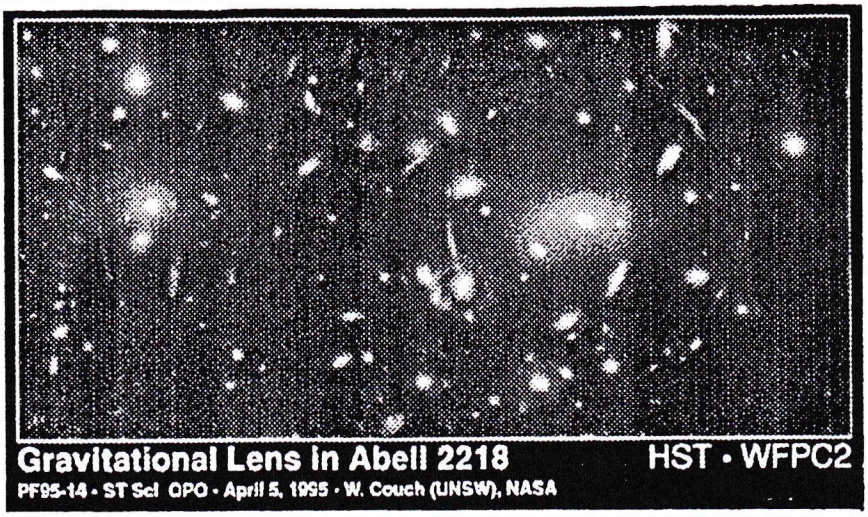
REFLECTIONS



Gravitational Lens in Abell 2218 HST • WFPC2

PR95-14 • ST ScI OPO • April 5, 1995 • W. Couch (UNSW), NASA

REFLECTIONS

December 1995

Gravitational lensing as observed by the Hubble Space Telescope help illustrate to existence of large amounts of dark matter. From Saturday Morning Physics lecture by Dr. Shawn Mckee.

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 Bill Razgunas at (313) 995-0934.

This Month:

December 15 - Meeting at 807 Dennison Back by popular demand - Several Lowbrows will give short talks on selected areas of Astronomical interest.

December 16 - Public Star Party at Peach Mountain Observatory Peach Mtn has always been a good place to watch meteors. Maybe we'll see some Gemind stragglers.

December 21 - New Moon at 9:22 pm EST

December 23 - Public Star Party at Peach Mountain Observatory Venus in SW above a close pair of Mercury and Mars (1 degree apart), low on the horizon with a slim crescent Moon between. Alpha and Beta Capricornus above it all.

Next Month:

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

January 19 - Meeting at 807 Dennison I can't believe it's 1996 already. Apparently neither can our VPs. Speaker/topic under investigation.

January 20 - New Moon at 7:50 am EST and

January 20 - Public Star Party at Peach Mountain Observatory A good night to split some close binaries on the club's new 6" f10 refractor.

January 27 - Public Star Party at Peach Mountain Observatory Come on out tonight for some easy observing. Venus is closing in on Saturn. The Moon is at fist quarter. Orion transits just after 9 pm.

Lowbrows in Sky & Telescope Magazine ! - Well at least evidence of Lowbrows. In the January issue, on page 103, is an aerial view of the telescope field at last September's Astrofest in Kankakee, Illinois. On the very left side of the picture is Doug Scobel's car (silver Ford Aerostar) and Fred Schebor's blue awning tent. Some guys will do anything to get in the press.

Get A 60 INCH TELESCOPE FOR $100.00 !

by Doug Scobel

Well, not exactly. But, if you like to go after faint nebulae, you CAN get your telescope to perform like a 60 inch with a little, $100.00 (or less) accessory called a Nebular filter. With it you'll be able to see things through your telescope that you never thought were possible.

What They Do - Without going into a lot of detail, the way these filters work is to block out most wavelengths of light except for those which are commonly emitted by gaseous nebulae. The net effect is to let the light of the nebula pass through unattenuated, while the background is darkened. So, although the object is not made any brighter, it is the resulting increase in contrast of the nebula against the background that makes the nebula become much more visible. For me, the enhancement was so dramatic that when I tried mine for the first time, it felt like suddenly I had quadrupled the aperture of my telescope !

There are actually two classes of filters currently available. So-called Light Pollution Rejection (LPR) filters are designed to reject wavelengths from certain artificial lights and natural sky glow, and allow the rest to pass through. LPR filters are sometimes called broadband filters, because they pass a wide range of wavelengths. Nebular filters, on the other hand, are actually specialized LPR filters, passing only the narrow portion of the visual spectrum that brackets the desired emission lines and rejecting the rest. For this reason nebular filters are sometimes called narrowband filters.

One thing to keep in mind is that these filters work better with certain classes of objects than others. They work the best with most emission and planetary nebulae, and not very well with galaxies and star clusters. The reason is that emission and planetary nebulae emit light at certain wavelengths, namely hydrogen beta at 486.1 nanometers (nm), and doubly ionized oxygen (O III) at 495.9 and 500.7 nm. In this case, it is easy to design a filter that passes these wavelengths and rejects the rest. However, stars, galaxies, and reflection nebulae emit light pretty much across the entire spectrum, so there are no wavelengths that can be "singled out", and the contrast gain is modest at best.

How to Use Them - Usually you simply screw the filter into the rear of the eyepiece you are using. It can get to be a pain unscrewing and rescrewing the filter if you switch eyepieces often. If you own a Schmidt-Cassegrain telescope you can get filters sized to screw into the rear cell of your telescope, in front of the star diagonal. This will let you change eyepieces without replacing the filter. If you have an eyepiece with enough eye relief, you can even hold the filter between the eyepiece and your eye. However, with narrow bandpass filters, you have to be careful to keep the filter exactly normal to the optical axis. If you don't, the angle will cause the bandpass to "shift" off the desired wavelengths dimming the nebula.

In any case, I have found it to be important to keep stray light from hitting the filter from the "eyeball" side. Nebular filters act as mirrors, reflecting the rejected wavelengths rather than absorbing them. So, if any stray light (even sky glow) enters the eye lens of your eyepiece, it will reflect off the filter and back into your eye, reducing contrast. Use a shroud, or at least cup your hands around the eyepiece to keep all stray light out. Try it and you'll see a big difference.

What Kind to Get - If you can afford to buy only one filter, which one would I recommend? I own Lumicon's Deep Sky, UHC, and O III filters. The Deep Sky is a broadband LPR filter, while the UHC is narrowband and the O III is REALLY narrowband (the UHC passes both the Hydrogen Beta and the O III lines; as its name implies, the O III passes only the O III lines). At relatively dark sites, like Peach Mountain, the one I find myself using the most is the O III. It consistently provides the best "60 inch" results. A close second is the UHC. I have also heard that Orion's Ultrablock filter is very good, but I have never tried it in a side by side comparison with the O III or UHC. The filter I seldom use is the Deep Sky. It generally provides the least noticeable contrast gain, but sometimes helps with galaxies. Perhaps in a more light polluted environment it would work better due to the artificial sky glow. If I could only keep one, though, it would be the O III.

Another thing to consider is the kind of viewing you expect to do. If you intend to spend most of your time observing small, faint planetary nebulae at high magnifications, then you may wish to consider

the Lumicon UHC or Orion's Ultrablock, instead of the O III. In my experience, the O III's extremely narrow bandpass lets so little light through that at high power (say, 200x or higher), the view is sometimes too dim and it's hard to see any detail. Whenever I go to high power I'll use the UHC and actually see more.

Observational Comparisons - Here is a sampling of objects that in my experience benefit greatly from the use of Nebular filters. Note that what I've listed here are only the big, bright, showpieces. There are many more smaller, fainter (mostly planetary) nebulae that benefit greatly from nebular filters as well. Also, note that my descriptions here are from the moderately light polluted skies of Peach Mountain, using my 13" Dob. Other sites and/or telescopes may let you see more or less, but the difference between observing with and without a filter should be similar.

Veil Nebula - This supernova remnant in Cygnus is notoriously difficult to observe. I had seen it before, but it had always been very faint, and with little detail. But with the O III filter it really comes alive ! The brighter portions, which are barely visible without the filter, are now bright and easily seen even without using averted vision. Fainter portions throughout the huge complex come into view. All the filamentary structure seen in photographs is now apparent - it's now obvious why it is called the Veil. I've considered making a sketch of it, but there's so much detail that I doubt that I could begin to capture it all. Just to see this nebula alone might be worth the price of the filter.

Dumbbell Nebula - The bright planetary nebula M27, is impressive enough without a filter. But, with the O III, it's even more impressive. Its entire oval outline is apparent, with the "dumbbell" shape superimposed on top of it. There are also fine details in the brighter portions.

Lagoon Nebula - Also known as M8, in Saggitarius, this cluster in nebulosity should be an excellent object if observed from a really dark site. But from Peach, it's low in the South, which is usually pretty murky. The nebulosity is pretty much washed out except for the brighter portions. But with the UHC or O III, the nebulosity expands to twice the diameter that is visible without it. Details that were hidden now pop out at you. The dark "lagoon" now is framed by glowing gas. It's a fantastic view.

Omega or Swan Nebula - M17, also in Saggitarius, is typically a pretty good sight, as portions of it have a fairly high surface brightness. With the UHC or O III nebulosity and detail that were previously hidden are now visible. Like M8, with the filter the nebula appears to be nearly twice as large as without it. The "swan" shape (it always looks like a "2" to me) is now very bright, and there is structure everywhere.

Trifid Nebula - You say you have trouble seeing the dark lanes that give M20 its popular name? With the UHC or O III they're a cinch - very inky black against the surrounding nebula. The reflection portion of the nebula nearly disappears, though, with the narrowband filters. To me it is enhanced slightly by using the Deep Sky filter.

Eagle Nebula - M16, in Serpens, is an open cluster embedded in nebulosity. Without a filter, I've only on the darkest of nights noticed any nebulosity at all. With the O III, however, the nebulosity pops into view, and the eagle shape is easily apparent.

Helix Nebula - NGC 7293, a very large, low surface brightness planetary nebula, is also situated low in the South in Aquarius. If you can find it without the filter, it just looks like a slight brightening in the background glow. With the O III, it now shows its true self, clearly nearly circular with a "hollow" appearance. Some portions of the ring appear to be brighter than others.

Rosette Nebula - This diffuse nebula surrounding the bright open cluster NGC 2244 in Monoceros has always been nearly invisible to me, only a couple bright portions being apparent. Low magnification and the O III really makes it pop out. With it the nebulosity surrounds the cluster like a wreath, with lots of structure and detail.

Great Nebula in Orion - You wouldn't think that the bright nebula M42/M43 should need any help. But the O III helps bring out the faint outer portions of the nebula. At low magnification, the entire fan shape is apparent, and details previously hidden can be seen. It also enhances M43 noticeably, which without a filter is rather unimpressive compared to its neighbor.

Owl Nebula - M97, a relatively low surface brightness planetary nebula in Ursa Major, has never impressed me much until I used the O III on it. The O III makes it look much brighter, with a

much sharper edge. The "eyes", though, still elude me. I can tell that there are brightness variations, but had I never seen a photograph of them I doubt that I would ever describe them as looking like eyes. Perhaps they are more apparent from a truly dark site.

So, what are you waiting for? They're not that expensive, about $80.00 to $100.00 brand new, even less if you can find one used. Plus, like a Barlow lens, you can use it with any of your oculars. So, for about the price of a good eyepiece, you too can look through that 60 incher you've always dreamed about! Or at least you'll feel like you are.

A New Look for an Old Observatory

by Christopher Sarnecki
(with help from Patricia S. Whitesell)

It has been over a year and a half since the Lowbrows have met at the Detroit Observatory. Many Lowbrows may be wondering what is happening at our old stomping ground (for those of you that may not know Detroit Observatory is located at the edge of the University of Michigan's medical campus at the corner of Observatory and East Ann Streets).

In March 1994, the Office of the Vice President for Research took on the oversight of the Detroit Observatory, with the intention of raising funds for its restoration. Vice President for Research, Homer A. Neal, named Dr. Patricia S. Whitesell as Chair of the Observatory Advisory Group, and appointed the following members:

- Mrs. Anne Duderstadt, Institutional Advancement Officer
- Dr. Robert Warner, Professor Emeritus and former Archivist of the United States
- Dr. Patrick Seitzer, Assistant Professor of Astronomy
- Dr. William Hennessey, Professor of History and Director of the Museum of Art

In a presentation given to the Lowbrows by Dr. Nick Steneck, Professor of History, on February 18, 1994 we were informed of some significant facts about this venerable, historic structure:

- The Detroit Observatory, constructed in 1854, is the most significant unaltered mid-nineteenth century observatory in America with its original instruments still intact and operational.
- President Henry Tappan had the observatory built to fulfill his vision of developing the University into America's first research university.
- The Fitz 12 inch refractor was one of the largest telescopes in the world at the time it was installed in 1858.

We also learned that we would soon need to relocate our meetings out of the observatory to make way for the restoration of the building. The restoration of the observatory is about commence. The Board of Regents recently approved funds for the restoration. In a recent conversation with Dr. Whitesell, we have been informed that the project has engaged a local preservation architectural firm to restore the structure for use as a museum of science. The observatory will serve as a meeting place for special purposes relating to science, research, and University history. A use plan for the building will be developed by the Observatory Advisory Group.

A telescopes subcommittee has been formed to identify options for the restoration of the 12 inch Fitz refractor and the 6 inch Pistor and Martins meridian circle and transit telescope. Dr. Seitzer will serve as Chair. Committee members include:

- Dr. Rudi Linder, Professor of History
- Dr. Nick Steneck, Professor of History
- Dr. Gary Bernstein, Assistant Professor of Astronomy
- Dr. Richard Teske, Professor Emeritus of Astronomy
- Ken Banas, student member, Astronomy Department

In discussions with Dr. Whitesell the term "restoration" was repeatedly mentioned in reference to the observatory and the telescope. Use of the telescope beyond that of a museum item has not been determined at this point in time. If the Lowbrows have any thoughts on the use of perhaps it would be appropriate to approach the Telescope Committee with our collective thoughts and make our wishes known. Perhaps this a topic for discussion for our December meeting. Bring your ideas and we'll discuss them.

From the Observatory

by Bernard Friberg

Congratulations are in order to Mark Cray for building the new 6" f10 doublet refractor in record breaking time. Approximately 1.5 weeks after the tubing arrived the telescope construction was completed and the paint drying. This sets a record for a major project. The refractor is mounted, aligned, and has been given a preliminary evaluation. The performance is --- while not perfect --- is quite nice and very usable. Two stars separated by 1.8 arc sec. are clearly resolved, separated enough to 'drive a truck through'. (Our editor has been doing a lot of binary star observing and this is one of his pet expressions). Probably 1.2 arc sec. will also be resolved. The absolute minimum has yet to be determined. The Pleiades are outstanding with the 70 mm eyepiece, the faint stars are pinpoints of light. The Orion nebulae is breathtaking.

A 7 year old was having some difficulty adjusting his eye position at a recent open house. His father was giving him instructions - 'try moving your eye further away'. Some seconds later, 'try moving closer to the eyepiece'. Still no success, he was about ready to give up. Then, 'O boy, I see it, I see it'. This made it all worthwhile. Appreciation is often enhanced when considerable effort is involved. Most open clusters should also look great. Those elusive galaxies will be easier to find. The view of the Moon is also breathtaking.

Eyepiece - power combination are as follows:
70 mm - 22x
50 mm - 30x
40 mm - 38x
32 mm - 47x
20 mm - 76x
16 mm - 95x
6.5 mm - 234x
4.8 mm - 318x

An 80 mm f5 "Cray" refractor finder scope was also recently mounted to the 24" scope. A 5 degree field is nice for those 'bright', expansive objects.

[The binary Bernard refers to is Zeta Aquarius - 22 degrees 28.8' RA, -00 hrs 01 mins DEC, Mags 4.3 and 4.5, separation 1.8", position angle 266. Below is my report when viewing this star with a 13" Newtonian:

VISUAL: This star proved to be a real challenge. Not having ever "split" a star with such a close separation I did not necessarily have the confidence in what I or my scope could do. First I checked Epsilon Lyre ("double- double") with a 16 mm eyepiece to see if I could split it. These double pairs have separations of 2.6" and 2.3". Then I returned to Zeta and used a 26 mm Pretoria with a 2.8 X Klee Barlow yielding a magnification of 150. No luck. Fortunately fellow Lowbrow Doug Scobel helped me collimate the scope using Polaris and a 7 mm Nagler then fine collimated with the additional use of the 2.8 X Klee Barlow. Again returning to Zeta using the 7mm (200x) still did not split the star. Finally we used a 4.8 mm Nagler with an aperture stop and split the star nicely. To split close doubles use HIGH magnification and an aperture stop when observing with Newtonian scopes.

TECHNICAL: Both stars are spectral type F, and have masses (1.13 and 0.85) close to our Sun. At 75 light years away this true binary's orbital period is still undetermined with estimates from 400 to 1600 years. A possible third star exist and is believed to be red dwarf (dM1 or dM2) at 0.28 solar mass.

This binary is a good test for small telescopes. If you enjoyed this binary there are 99 more to be found in the Astronomical League's Double Star Club article in last July's REFLECTIONS - Ed]

Please Help Lighten My Load

by Doug Scobel

I still have LOTS of 1996 Wonders of the Universe calendars! Boy, are they heavy! Again, prices are only $8.00 for club members, $9.00 for non-members. Besides getting one for yourself, consider selling some where you work (I've sold five at work myself so far), plus they make great stocking stuffers, hint hint. Also RASC Observer's Handbooks have arrived. I'll be bringing them all to the December meeting. If you still would like to order a 1996 Observer's Handbook, or anything else from Sky Publishing, give me a call or see me at the meeting. For your convenience, I'll bring a copy of the 1996 Sky catalog.

Galileo to the Press

A Collection of NASA Press Releases

Probe Data Received [at] 6:12 pm ! - NASA JPL has just confirmed that they have received confirmation of "Probe lock". This means that Probe data has been received by the orbiter, indicating that the Probe mission into Jupiter's atmosphere has been successful! This is great news for the Galileo team, and a major milestone in the mission.

Orbital Insertion Burn... - JPL reported at about 8:25 PM that the Galileo Orbiter began firing it's main engine to place it into orbit around Jupiter! The burn will continue until a little past 9:00 tonight. Without this burn, Galileo would not slow down and go in to orbit. Cheers went up all over JPL at the Galileo control center and in the auditorium where observers and dignitaries anxiously awaited this moment. *[Latter, just after 9:00 pm EST NASA confirmed engine cut-off. More cheers went up all over JPL - Ed].*

"On Jupiter" on the Discovery Channel - A new documentary called "On Jupiter" will be shown on the Discovery channel. The hour-long program is narrated by actor John Hurt, and will chronicle the story of Jupiter starting with Galileo Galilei Jupiter observations in the 1600's through the impacts of Comet Shoemaker-Levy last year. The program will also provide a preview of Galileo's arrival of Jupiter on December 7, 1995. Computer animations and information will be provided to give the viewer a solid background on the significance of the December 7th encounter. Also featured will be interviews with comet discoverers Gene and Carolyn Shoemaker and David Levy, Caltech planetary scientist Andrew Ingersoll, Galileo Project Manager Bill O'Neil and other members of the Galileo mission team. "On Jupiter" is slated to air on the Discovery Channel on... ...December 16 and 20 *[Repeat times].* Check your local TV listings for the time of the show in your area.

Dark Physics in the Morning

by Christopher Sarnecki

This is the second and final report on the University of Michigan's Saturday Morning Physics lecture series. This the third of three topics presented by the Physics Department was titled The Search for What Makes Up 90% of Our Universe - The Dark Matter Puzzle and was given by Dr. Shawn Mckee. Like the two previous lectures this presenter made extensive use of multimedia tools such as experiments, videos, and visuals as well as presenting on going research. The audience got a chance to look through a diffraction grating, first at normal white light to view how light is made up of all the colors of the visual spectrum, then by looking a neon light we observed how this type of light is made up of only portions of the visual spectrum. Below is a synopsis of the presentation.

Dark matter is defined as matter not observed but known to exist because of its gravitational effects on other matter. Dark Matter was first explored when Astronomers in the mid 1800's observed Uranus and discovered that a hidden gravitation mass was altering it's orbit. That mass later was found to be Neptune. The study of star Sirius found this star to wobble along it's path around the galaxy. Telescopes later discovered Sirius B, the faint companion to Sirius. Still later Astronomers studying the movement of stars in the plane of our galaxy observed that stars were oscillating up and down in the galactic plane were being held in check deifying the momentum of the same up and down movement. The more Astronomers looked the more dark matter was observed. Dark matter, it seams is everywhere.

The Big Bang model of the Universe predicts that there is more matter than that which is observed. Approximately 10% of the Universe is matter seen as stars and galaxies. The existence of the other 90% of this unseen matter is referred to as dark matter. Big Bang theory predicts how the cosmos began as a super dense, unimaginably rich form of energy compressed to a single point in space. Cosmologist studying the Universe from the moment of the Big Bang through time have shown how this early pure energy state expands, cools, and allows the formation of elementary particles, atoms, and molecules. To determine the ultimate fate of the Universe Cosmologist have modeled the cosmos as "closed, flat and open". If sufficient matter exist in the Universe to stop the expansion of the Universe and turn itself back on itself the cosmos is "closed". If insufficient matter is present then the Universe will expand forever and is considered "open". A "flat" Universe is one whose density is neither sufficient for an open or closed model but one that lies balanced in between.

Cosmologist label this critical density with the Greek letter omega. A flat Universe is exactly equal to omega = 1. The study of dark matter is crucial to determining the ultimate fate of the Universe. If omega is less than one the Universe is considered open and will expand forever. If omega is greater than one then the Universe is closed and will end its fate in a big crunch.

Early studies of the rotational velocity of stars in the outer edges of the planes of galaxies help reveal the existence of an unseen gravitational mass causing stars to rotate at speeds faster than the visible matter would have otherwise indicated. This dark matter or missing mass helped Astronomers quantify this 90% of the missing mass of the Universe. A further conformation of this missing mass was discovered by Tony Tyson of Bell Labs who used gravitational lensing or the bending of light from faint far away galaxies by the mass of a foreground galaxy. A video was shown indicating a computer modeling of this effect. Just as light is bent in a refractor lens the computer simulation shows what the image of a distant object is distorted by the mass of a foreground galaxy. Further conformation of the existence of dark matter. An additional video was shown of the work of Astronomer Margaret Geller showing the large scale structure of the Universe. "Bubbles" of clusters of galaxies and "voids" between galaxies are evidence of the effects of large amount of mass in the universe.

Dark matter candidates are identified according to the following:

- Baryonic or Normal Matter
  - Red or Brown Dwarfs
  - Black Holes
  - Hot Intergalactic Gas / Failed Galaxies

- Non-Baryonic or Exotic Matter
  - Hot Dark Matter (HDM), fast moving molecules
  - Cold Dark Matter (CDM), slow moving molecules

Perhaps there exist more normal matter (Baryonic) than is observed. By looking at some normal matter candidates that may have been over looked we might closed the Universe. The repaired Wide Field Planetary Camera 2 on the Hubble Space Telescope (HST) was used to confirm the what the contribution might be by Red Dwarfs. These low mass stars are believed to exist in significant numbers, but the HST did not find conformation of a significant numbers of Red Dwarfs to contribute to the dark matter answer. Massive Compact Halo Objects (MACHOs) is the search for the dark matter contribution by Brown Dwarfs (Jupiter like objects). Through the use of gravitational lensing events Astronomers estimate that Brown Dwarfs mass contributes about 10% of the rotation momentum in a galaxy. The study of the mass contribution by Black Holes are not conclusive at this time. Intergalactic clouds of dust are estimated to contribute no more that 20% of dark matter needed to close the Universe.

This bring us to exotic matter's contribution to the dark matter puzzle. It is believed that CDM and HDM together best describe the present state of the Universe. The speaker presented his research in attempting to observe Weakly Interacting Massive Particles (WIMPs). WIMPs are a prime candidate for CDM. By attempting to observe the existence anti-protons, which are produced when WIMPs decay one could confirm the contribution of this particle to the dark matter question. Unfortunately no anti-protons were observed. HDM, unlike CDM, has a particle which Physics know exist. The neutrino is an extremely abundant particle. Approximately 1,000,000,000,000,000 neutrinos pass through each of us each second ! The speaker is a participant in the Cosmologically Significant Mass Oscillation Search (COSMOS) which will study muon and tau neutrinos in an experiment at the National Fermi Lab and is expected to start by the year 2000. It is possible that these particles may have a significant contribution to the missing mass dilemma.

So what is the status of these missing mass candidates ? Baryonic (normal matter) is not believed to exist in significant amounts to close the Universe. Exotic matter (Non-Baryonic) does hold some promise of finding the missing mass. Current investigations into this subject have concluded what dark matter isn't. Future study, perhaps some of that which is about to be done by the University of Michigan's Physics Department, will answer the question of the missing mass of the Universe.

[The Department of Physics is to be congratulated for conducting this fine lecture series. If you missed it the department has indicated a continuation of these presentations next fall.]

In Other News ...

SECRETARY OF THE INTERIOR BABBIT ANNOUNCES HISTORIC COOPERATIVE AGREEMENT BETWEEN NASA AND THE U.S. FISH & WILDLIFE SERVICE
by Tom McKendree *[Submitted by Doug Warshow]*

WASHINGTON, D.C., October 5, 1995. Secretary of the Interior Bruce Babbit called a press conference today to announce the implementation of a new cooperative agreement between the U.S. Fish and Wildlife Service and the National Aeronautics and Space Administration. Secretary Babbit called the agreement an historic step towards successful implementation of Reinventing Government, Stage II, that has been developed by the Clinton Administration.

Under the terms of the new agreement, packs of wolves, imported from Canada, will be introduced into several NASA centers. In particular, the NASA research and space flight centers at Goddard (Greenbelt, MD), Marshall (Huntsville, AL), Johnson (Houston, TX), and Ames (Moffett Field, CA) have been targeted. "Wolves are an endangered species that need special protection to allow their populations to increase," said Babbit. "Private landowners have objected to releasing wolves in National Parks, fearing that they will wander onto private lands and attack livestock. This agreement represents an innovative compromise that will allow the wolves to prosper in areas where the public will have no objection to their presence."

The Administrator of NASA, Daniel Goldin was present at the Department of Interior press conference. When asked for his reaction to the plan, Goldin said, "NASA is undergoing unprecedented downsizing in response to the desire on the part of the Clinton Administration and the U.S. Congress to reduce the size and cost of the Federal Government. This agreement with the Fish and Wildlife Service will introduce ecologically sound management practices that will replace the 'business as usual' approach to personnel issues at NASA. Federal agency work forces are no different than overpopulated herds of deer or elk in our country today. We, too, need to thin the herds," said Goldin. Secretary Babbit interrupted Mr. Goldin to reassure NASA employees that the vast majority of them would be unaffected by wolf pack predation. "Keep in mind that wolves tend to prey mostly on the weak and slow," Babbit said. "Most NASA employees can move pretty fast and stay out of harm's way. If you keep alert and show no fear, chances are the wolves will leave you alone. Our wildlife experts tell me that 95% of the NASA employees will be unaffected by wolf predation in an average year."

An information brochure, entitled "Adapt or Die," will be distributed to all NASA employees. The brochure explains the ecological basis for this new management policy. It also points out that there are severe penalties for harming endangered wolves, even in self-defense. It says, "Keep in mind that humans are not an endangered species and, therefore, lack protection under the law."

THE FIRST EVER REFLECTIONS I HATE QUESTIONNAIRES - QUESTIONNAIRE

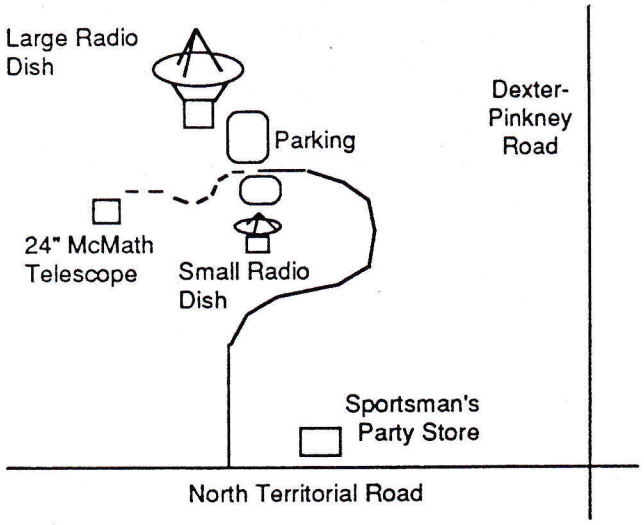
In an effort to better serve the Astronomy consuming Public (Lowbrows) your Editor is conducting this survey. That's right. Just fill out this little survey on what you would or wouldn't like to see in the newsletter and bring to the next meeting. I'll compile the information and publish it in the next issue.

1. The last two issues have eliminated the monthly star charts in favor of more articles. Is this acceptable ?
2. Should the newsletter be shortened or expanded ? If shortened - What should be eliminated (Masthead, articles, monthly star chart, Places) ?
3. Yours truly has placed emphasis on club member articles above on-line information. Is this acceptable ? If so would you be willing to contribute articles of your own ?
4. The type face has been changed to 10 point Helvetica instead of 12 point Times. Is this type face any easier on your eyes ?
4. Other thoughts that you may have. Please wright clearly in the box. →

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
Ann Arbor, MI 48103

Telephone Numbers

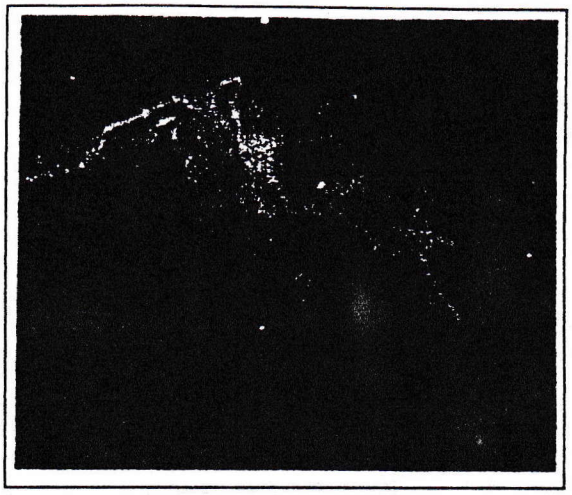
President:	Bill Razgunas	995-0934
Vice Pres:	Mark Cray	283-6311
	DC Moons	254-9439
	Tom Pettit	878-0438
	Tom Ryan	662-4188
	Randy Stevenson	429-5099
Treasurer:	Doug Scobel	429-4954
Observatory Director:	Bernard Friberg	761-1875
Newsletter:	Chris Sarnecki	426-5772
Peach Mtn Keyholder:	Fred Schebor	426-2363

MONTHLY MEETING:

Back by popular demand:

SELECTED MEMBERS OF THE LOWBROWS (or should we say conscripted members ?) WILL GIVE SHORT PRESENTATIONS ABOUT SELECTED TOPICS OF ASTRONOMICAL INTEREST

The meeting starts at 7:30 pm, Friday, December 15th in Room 807 of Dennison Hall (Physics & Astronomy Building)



At 7,000 light years away the pillars of M16 illustrate a process called "photoevaporation". See last month's article for more information. Hubble image by Jeff Hester and Paul Scowen, Arizona State University and NASA

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

Check your membership expiration date on the mailing label !