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# Reflections *anotivort*

## of the University Lowbrow Astronomers

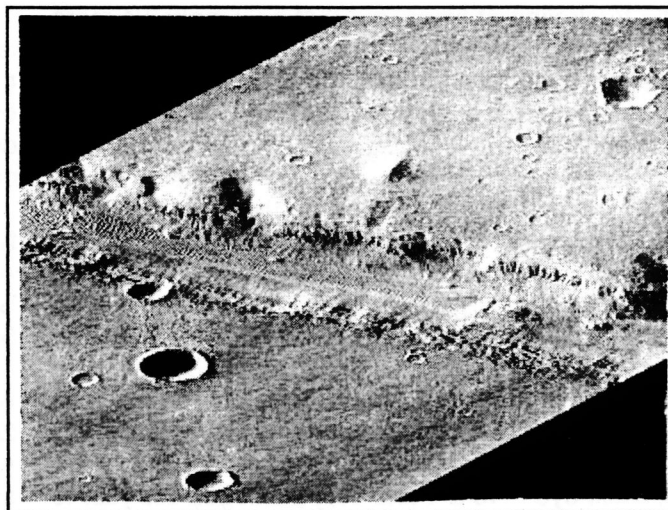
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October 1997

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### View of Nirgal Vallis, Mars

Perspective image of Nirgal Vallis as imaged by the Mars Orbital Camera onboard the Mars Global Surveyor Orbiter. Nirgal Vallis is one of a number of canyons called valley networks or runoff channels. Much debate concerning the origin of these valleys centers on whether they were formed by water flowing across the surface, or by collapse and upslope erosion associated with groundwater processes. Photo credit: Malin Space Science Systems and NASA



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## 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 (313)480-4514.

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### This Month:

**October 17 - Meeting at 807 Dennison** - Topic: Supernovae and Black Holes.

**October 25 - Public Star Party at Peach Mountain Observatory** - Venus passes 2 degrees south of Mars.

**October 26 - Daylight Savings Time ends** - "Fall" back & grab an extra hour of sleep. You'll need it from staying out late at last night's star party.

**October 31 - New Moon** at 5:01 am EST Hey, It's Halloween - Oh, that's scary!

### Next Month:

**November 1 - Public Star Party at Peach Mountain Observatory** - Young Moon in WSW.

**November 21 - Meeting at 807 Dennison** - Dr. Philip B. James, Univ of Toledo, will speak on Mars. No, I mean he will speak on Earth about Mars.

**November 22, & 29 - Public Star Party at Peach Mountain Observatory** - What are the odds that it will be clear on both nights - TINY

**November 29 - New Moon** at 9:14 pm EST

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**Saturday Morning Physics** - 10:30 - 11:30 am in Denision Hall Auditorium. Check out the flyer inside this issue for a full explanation - submitted by Dick Sider.

October 11,18,25 - **The Fate of the Universe** - Dr. Greg Laughlin will explain the evolution of the cosmos.

November 1,8,15 - **The Science of Solids** - Dr. John Erland will present the physics of condensed matter.

November 22, December 6, 13 - **Atoms in a New Light** - Dr. John Yukich to introduce atomic physics and more.

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# At the Open House & What to Show the Public

by Mark Deprest

Well Fall is coming on quickly and with it some of the best astronomical objects to point your telescope or binoculars at. The Open House's at the observatory are the best opportunity we have to entertain, introduce, and educate the public to the enjoyment we experience every time we turn our eyes skywards. The weather here in Michigan can be a little frustrating at times, but that only make us more appreciative and sometimes in awe of those moments when the sky goes "crystal" and the ethereal glow of the Milky-Way becomes a glorious pathway running from horizon to horizon.

This Fall we are being treated to two of the most spectacular planets in the solar system - Jupiter and Saturn.

Jupiter shows up in the southern sky at -2.5 magnitude and is almost 43 arc seconds in angular size. Its speeding rotation means a constantly changing view. The Galilean moons of Jove waltz thier way around in an everlasting dance. Their shadows appear on the face of Jupiter like a miniture black-eye. We are also very privileged this year to Jovian satelite occultations and eclipses. No study of Jupiter can be considered complete if you haven't glimpsed the Great Red Spot or watched it transit the face of Jove.

Saturn with its rings tilted at a 10.33 degree angle away from us and shining at about 0 magnitude is always a great sight. Saturn's angular size is about 20 arc seconds and its northern declination make it a superior object in any astronomical telescope, but at higher powers even its "creamy" complexion shows subtle flaws. A good test for you and your eyes is to spot the Cassini Division in the outer reaches of the rings. The multitude of telescopically visible moons are always a treat and sometimes a challenge.

Now for a few of my favorite deep-sky objects of the Autumn nights by constellation:

Aquarius - the water carrier:

M2 - RA 21h 33m Dec -00 49 6.5mag 13'

A globular cluster of at least 100,000 stars. About 50,000 ly distant and about 150 ly across.

NGC7009 - RA 21h 04m Dec -11 22 8.3mag 28"x22"

A planetary nebula called the "Saturn Nebula" by Lord Rosse because of extending arms or ansae which protrude from the nebula when seen under a good, dark sky. Only 3900 ly distant, which means its about 0.5 ly across.

Pegasus - the flying horse.

Epsilon Peg. - RA 22h 43m Dec +30 18 3/9mags

A lovely colored double star, widely separated at 81" making it easy to split in almost any telescope.

NGC7331 - RA 22h 37m Dec +34 25 10.4mag 11'x 4'

One of the brightest non-Messier galaxies. A large scope can show a dark dust lane. This galaxy can be spotted with binoculars or finder scope. At a distance of 50 million ly this is a beauty.

Andromeda - the chained lady

M31 - RA 00h 42m Dec +41 16 3.5mag 178'x40'

The largest, brightest spiral galaxy near the Milky-Way. It is easily seen naked-eye from a dark site and in binoculars it is truely a glorious sight. A low power wide field of view eye piece will show two of its companion galaxies. At a distance of 2.2 million ly away this is the farthest naked-eye object visible.

NGC7662 - RA 23h 56m Dec +42 33 8.6mag 17"x14"

A very nice planetary nebula commonly known as the "Blue Snowball", find this one and you'll see why it got that name. 5600 ly away.

Almach - Gamma And. - RA 02h 04m Dec +42 18 2/5mags

Almach means "The Foot" in Arabic, because this double star is the foot of Andromeda. These two stars are separated by 10" and have always looked bluish and orange to me. 80 ly distant

Cassiopeia - the queen

M52 - RA 23h 24m Dec +61 35 6.9mag 13'

An excellent open cluster that is 3000 ly away and 10 to 15 ly across.

NGC457 - RA 01h 19m Dec +58 20 6.4mag 13'

Another good open custer commonly called "The Owl Cluster" due to the two bright stars that look like eyes of an owl with outstretched wings. This one is beautiful in low power.

Perseus - the hero

NGC884 and NGC869 - RA 02h 22m Dec +57 07 4.4mag 60'

The Double Cluster is one of the finest sights in the sky. Always a great crowd pleaser. In low power these two fit in the same field of view. 8000 ly away. Don't pass this one up, it truely is marvelous.

Eta Per. - RA 02h 51m Dec +55 52 4/8mags

A color contrasting double star separated by 28" they are easliy split at about 100x and have always looked gold and deep blue to me.

Well there is so much more to see in the Autumn night sky that I might have to write a follow up article next month. But before I conclude this one and before they slip slowly

below the western horizon catch those Summer time favorites such as M13 a globular cluster in Hercules, M57 The Ring Nebula in Lyra, M27 The Dumbbell Nebula in Vulpecula, Collinder399 The Coathanger in Vulpecula (best in binoculars), M11 The Wild Duck open cluster in Scutum and just about any where in the constellation of Cygnus.

So come on out to the next open house and enjoy the Autumn night sky with us. It truly is a wonderful experience.

## **Update on the Restoration of the Detroit Observatory**

Patricia S. Whitesell, Ph.D.

Assistant to the Vice President for Research, The University of Michigan and Chair, Detroit Observatory Advisory Group

With the design phase of the restoration complete, the construction phase began in June 1997 and will continue through March 1998. The construction phase includes interior and exterior work on the building. Examples of the work in progress include: foundation repairs; electrical and plumbing modifications; provision for handicapped access; replacement of a window that was blocked up when the director's residence was torn down in 1954; relocation of the meridian room door to its original location; replication of the missing clock pier; floor repairs; restoration of the original metal roof; replication of the missing ballustrade, missing spindles, and shutter dogs; repairs to the meridian hatch so that it will be functional again; repairs to the dome and replacement of the damaged paper-over-canvas lining; the addition of bird-deterrent screening at the dome perimeter; replacement of the stairs coming up from Ann Street; complete interior and exterior painting in the original historic colors; and a long, long list of other items.

A consultant is currently at work restoring the Fitz refracting telescope, under the supervision of my Advisory Group and our Telescopes Subcommittee. After the construction work on the building is complete, restoration work will begin on the meridian telescope and other instruments and artifacts, each artifact will be fully researched and documented, museum exhibits will be prepared, the building will be appropriately furnished.

The work in progress is going exceptionally well, with dedicated professionals making valuable contributions in their areas of expertise. There is a great deal left to do. I estimate that the work I have outlined will continue for the next 1.5 years.

I will be happy to provide your group with periodic updates-just prompt me when the next update is desired. Your interest in the project is appreciated.

I have received outstanding support and assistance from the Antique Telescope Society--a wonderful, national group of amateur astronomers who are widely knowledgeable about various historical aspects of astronomy. If you aren't familiar with them, here is their Web site address: [HTTP://www1.tecs.com/oldscope/](http://www1.tecs.com/oldscope/) The Lowbrows could be of similar assistance to me by sharing historical information relating to the Detroit Observatory and its instrumentation, and alerting me to the location of any artifacts that may originally have been in the Observatory but "wandered" over the years. I have been successful in locating various treasures that have wandered around the campus, so I appeal to your group to help me locate items that may have migrated elsewhere.

Refer to the Observatory's Web site at <http://www.drda.umich.edu/OVPR/other.research/detobs.html>. It is currently under construction and will be greatly expanded over the coming year. At the construction site, along Observatory Street, a large sign has been erected that includes all of the photographs on the Web, if they don't have Web access, could stop by to take a look at the sign to learn about the building's history.

I am in the process of writing a monograph on the early history of the Detroit Observatory that will be published this Spring by the Bentley Historical Library. If your group has interest in this piece, I will let you know when it is available. I will also be preparing articles on the restoration for various periodicals, as will other members of my team.

Please feel free to contact me at any time with questions or comments; e-mail is the most effective means. This restoration project, since it is in addition to my regular duties, is a labor of love that keeps me extremely busy, so please be patient if it takes me a while to respond, or if the restoration work appears to be progressing slower than you'd hoped. This is a complicated, sensitive project that must be done very carefully. Your interest is important, and I will do my best to be responsive.

## **Robert Burnham Jr. 1931 - 1993**

I wonder how many list members treasure their copy of Burnham's Celestial Handbook as much as I do. Probably quite a few. I wonder how many knew that Burnham had died? It's a very sad and shocking story. Take a look at this URL for the report:

<http://www.phoenixnewtimes.com/1996/current/feature1-1.html>

Regards,  
Gary Seronik

# NASA Receives Approval to Launch Cassini Mission

NASA Press Release: 97-225

NASA today received formal approval from the White House Office of Science and Technology Policy (OSTP) to proceed toward the launch of the robotic Cassini mission to explore Saturn and its moon Titan.

"NASA and its interagency partners have done an extremely thorough job of evaluating and documenting the safety of the Cassini mission. I have carefully reviewed these assessments and have concluded that the important benefits of this scientific mission outweigh the potential risks," said OSTP Director Dr. John H. Gibbons, who signed the launch approval.

NASA Administrator Daniel S. Goldin said, "I am confident in the safety of the Cassini mission, and I fully expect that it will return spectacular images and scientific data about Saturn, in the same safe and successful manner as the Voyager, Galileo and Ulysses missions."

White House launch approval is required by presidential directive due to the type of power source used to provide electrical power for the Cassini spacecraft and its scientific instruments, and the heater units that it carries to keep the spacecraft's instruments and electronics warm in deep space.

The Radioisotope Thermoelectric Generators (RTGs) and Radioisotope Heater Units used to power Cassini and keep its internal systems warm have been used in previous NASA missions ranging from Apollo to Galileo, and have been approved by five previous administrations ranging from Nixon to Bush. RTGs produce power by the heat generated through the natural radioactive decay of non-weapons grade plutonium dioxide, which is transformed into electricity by solid-state thermoelectric converters.

Before Administrator Goldin sent the request for launch approval to OSTP, two separate processes were completed to address the environmental and safety aspects of the mission. NASA completed an Environmental Impact Statement in June 1995 and a supplement in June 1997, as required by the National Environmental Policy Act and NASA policy.

Consistent with long-standing Presidential policy, the Department of Energy (DOE) prepared over the past seven years a comprehensive Safety Analysis Report. In addition, an Interagency Nuclear Safety Review Panel, including safety experts from DOE, NASA, the Department of Defense (DOD), the Environmental Protection Agency (EPA), and a technical advisor from the Nuclear Regulatory Commission conducted a comprehensive evaluation of the

safety analysis. This panel was supported by over 50 scientific experts from academia and industry.

DOD, EPA and DOE have written to the NASA Administrator confirming that, in their view, the safety analysis conducted for the mission is comprehensive and thorough.

Cassini is a cooperative endeavor of NASA, the European Space Agency (ESA) and the Italian Space Agency, or Agenzia Spaziale Italiana. The mission will send a sophisticated robotic spacecraft, equipped with 12 scientific experiments, to orbit Saturn for a four-year period and study the Saturnian system in detail. The ESA-built Huygens probe that will parachute into Titan's thick atmosphere carries another six scientific instrument packages.

Saturn is the second-largest planet in the solar system and is made up mostly of hydrogen and helium. Its placid-looking, butterscotch-colored face masks a windswept atmosphere where jet streams blow at 1,100 miles per hour and swirling storms roil just beneath the cloud tops. Previous spacecraft passing by Saturn found a huge and complex magnetic environment, called a magnetosphere, where trapped protons and electrons interact with each other, the planet, rings and surfaces of many of the moons.

Although it is believed to be too cold to support life, haze-covered Titan is thought to hold clues to how a primitive Earth evolved into a life-bearing planet. It has an Earth-like, nitrogen-based atmosphere and a surface that many scientists believe probably features chilled lakes of ethane and methane. Scientists believe that Titan's surface is probably coated with the residue of a sticky brown organic rain.

The launch of Cassini aboard a Titan IV-B/Centaur launch vehicle is scheduled for 4:55 a.m. EDT on October 13 from Cape Canaveral Air Station, FL. An on-time launch will deliver the Cassini mission to Saturn almost seven years later on July 1, 2004. Cassini's primary mission concludes in July 2008.

## Calendars! Handbooks!

by Doug Scobel

Once again, it's time to start thinking about calendars! But, I need to know from you what you would like, so that I know how many of each to order. So, please fill out the "order form" below, and get it back to me as soon as possible (send no money now). You can reply to me at the October meeting, call me at home, mail it to me, or even send me an email at [djscobel@ann-arbor.applicon.com](mailto:djscobel@ann-arbor.applicon.com). I will be ordering everything around the first of November, so you must reply before then.

# Sky & Telescope's Weekly News Bulletin - \*

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\* - available via SKY Online on the World Wide Web at <http://www.skypub.com/>.

**Status Report from Mars** - At a press conference Thursday, NASA scientists reported on the status of the two active missions at the red planet. While Mars Global Surveyor continues to circularize its orbit by aerobraking, its camera is already providing spectacular views of the surface. Although mapping is not set to begin until March, about a dozen moderately high-resolution test images have been transmitted back to Earth so far. Pictures with a resolution of 12 meters are already showing detailed views of canyons and dunes of Martian sand. Things are less rosy for Mars Pathfinder. Communications with the lander have been spotty lately, and researchers at the Jet Propulsion Laboratory have not received telemetry since September 27th. The lander was switched to its backup transmitter on October 1st and limited two-way communications were restored. The likely culprit of the problem is that Pathfinder's battery has finally died, which has made the lander lose track of time. It will probably be a couple of weeks before the health of Pathfinder can be fully determined and operations can then be designed to work around the loss of the battery.

**NEAR Looks Far** - While en route to asteroid 433 Eros, the Near Earth Asteroid Rendezvous (NEAR) spacecraft has become an astrophysical observatory. Mission engineers reprogrammed the spacecraft to monitor readings from its gamma-ray spectrometer, an instrument intended to probe the surface composition of Eros when the craft reaches it in February 1999. NASA announced this past week that the instrument has detected seven gamma-ray bursts from deep space. These mysterious eruptions of high-energy radiation pop off about once a day at random points on the sky. NEAR has now been added to an interplanetary network of gamma-ray-sensing spacecraft, which include those in Earth orbit -- such as the Compton Gamma Ray Observatory -- and the Ulysses and Wind spacecraft.

**Hubble Spies Neutron Star** - While not one of the Hubble Space Telescope's more stunning images, the Space Telescope Science Institute released the first direct image in visible light of a neutron star this week. Hubble's observations set the size of the 25th-magnitude object at no more than 28 kilometers across and with a surface temperature of 670,000 degrees Celsius (1.2 million degrees Fahrenheit). Nothing else other than a neutron star could fit such attributes. Fred Walter (State University of New York at Stony Brook) used Hubble to look for the visible counterpart of an X-ray source in Corona Australis detected in 1992 by the Rosat spacecraft. The pin-point

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Order Form

Calendar name	Quantity
Wonders of the Universe 1998 Calendar	_____
Astronomy & Space 1998 Weekly Calendar	_____
RASC Observer's Handbook 1998	_____

Your name: \_\_\_\_\_

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Wonders of the Universe 1998 Calendar

This is the monthly wall calendar, published by Hansen Planetarium, that club members have traditionally bought through the club. It features excellent photos, and is loaded with information regarding planet positions, meteor showers, eclipses, lunar phases, and many other happenings astronomical. Many members also sell these where they work or buy extras to give away as holiday gifts. They normally retail for around \$12.00 each, so this is a very good price.

Price: \$9.00 each

Astronomy & Space 1998 Weekly Calendar

We introduced this weekly desk calendar last year, and it was quite popular. It also features excellent photos (53 of them) relating to space and space exploration, and a special section previewing NASA launches and celestial events in 1998. Fred Schebor has a sample copy of the 1998 edition, or you may be able to find a club member who owns the 1997 version.

Price: \$9.95 each if the club orders at least 5  
\$8.95 each if the club orders at least 10

RASC Observer's Handbook 1998

This reference is published by the Royal Astronomical Society of Canada, and is chock full of all the "near space" observational information you can imagine, and more. It contains articles, illustrations, charts, tables, and ephemerides on the Sun, Moon, planets, asteroids, comets, meteor showers, eclipses, transits, occultations, zodiacal light, and well, you get the picture. A must for any serious, self-respecting solar system observer.

Price: About \$20.00 each

image of the neutron star, captured by Hubble's Wide Field Planetary Camera 2, was only 2 arcseconds from the X-ray position. The collapsed stellar core is believed to lie less than 400 light-years away.

**New Moon-Making Recipe** - Back in August, Shigeru Ida (Tokyo Institute of Technology), Robin Canup (University of Colorado), and Glen Stewart (University of Colorado) announced that their computer models placed additional restrictions on how the Moon formed. They explored the idea that something the size of Mars sideswiped the Earth in its infancy, a concept first offered by William Hartmann and Donald R. Davis in the mid-1970s. The "Big Splat" theory has wide appeal among geochemists because it explains, among other things, the Moon's low iron content and its complete lack of water. Now in the September 25th NATURE, the researchers explain that after such an impact, the outer region of the debris cloud circling the proto-Earth would coalesce into a Moon-size object after only one year. The result was the same no matter the number and sizes of the initial particles. The real surprise, however, was that only 15 to 40 percent of the post-impact debris wound up to be incorporated into the Moon. They also note that in one-third of their trials, the material created two satellites.

**A Twinkling Gamma-Ray Burst** - Astronomers have a new clue to the nature of gamma-ray bursts, mysterious eruptions of high-energy radiation that pop off about once a day at random points on the sky. Earlier this year, on May 8th, one such burst was recorded not only by orbiting gamma-ray detectors, but also by the BeppoSAX X-ray satellite, which pinpointed the burst's location on the celestial sphere almost instantly. Ground-based optical telescopes swung into action and found a previously unknown source of visible light at the position of the gamma-ray event. This soon faded, but not before astronomers were able to deduce that it was billions of light-years away, well outside our own galaxy. Radio telescopes observed a counterpart too, and over several weeks this source fluctuated in intensity like a twinkling star. Unlike visible twinkling, which is caused by irregularities in Earth's atmosphere, radio twinkling is caused by irregularities in the gas clouds pervading the Milky Way. Just as planets don't twinkle due to their finite angular size, so too should radio sources not twinkle if they are sufficiently large. As Shri Kulkarni (Caltech) and Dail Frail (National Radio Astronomy Observatory) report in Nature this week, the radio source coincident with the May 8th gamma-ray burst did stop twinkling after awhile, suggesting that the source of the radio emission had grown in angular size. From their detailed studies, Kulkarni and Frail deduce that the fireball must have expanded to a diameter of at least a tenth of a light-year since the eruption last May, implying that debris is flying outward at least 85 percent of the speed of light. This means the burst itself must have been outrageously energetic -- perhaps resulting from the collision of two neutron stars in a distant

galaxy, or even the collision of two black holes.

**Infrared Sky Survey Begins** - A 3.5-year-long project to chart the heavens at infrared wavelengths has begun atop Arizona's Mount Hopkins. The Two-Micron All-Sky Survey (2MASS) consists of identical 1.3-meter telescopes in United States and Chile equipped with 256-pixel-square CCD cameras. The project, a collaboration between NASA, the National Science Foundation, the U.S. Naval Observatory, and the University of Massachusetts, will completely map the sky at the near-infrared wavelengths of 1.2, 1.6, and 2.2 microns. The first observations have now been taken using the Arizona telescope. The project is expected to catalog 300 million stars and one million galaxies down to 17th magnitude, and should also turn up numerous asteroids, comets, and brown dwarfs. Details can be found in the August 1997 Sky & Telescope (page 46) and on the project's Internet home page at <http://pegasus.phast.umass.edu/>.

**Advanced Composition Explorer Takes Flight** - Still more space-science news: Launched by a Delta rocket on August 25th, the Advanced Composition Explorer (ACE) is NASA's newest sentinel for studying the composition of the solar wind. The spacecraft will take roughly three months to reach the L1 Lagrangian point, 1.5 million kilometers from Earth in the Sunward direction, where terrestrial and solar gravity are in balance. Once there, ACE will characterize the elements and isotopes flowing outward from the Sun and arriving from deep space as cosmic rays.

**Smoking Gun Sighted in Search for Asteroid Origins** - With the help of the Hubble Space Telescope, astronomers have discovered a 460-km-wide crater on Vesta, the third-largest known asteroid. Vesta itself only spans 580 km at its widest. According to coinvestigator Rick Binzel at MIT, the 13-km-deep crater near the asteroid's south pole is the "smoking gun" in a long-running campaign to explain how certain meteorites got to Earth. These so called "HED-class" meteorites share Vesta's basaltic composition, suggestive of magma or lava. So do a handful of much smaller asteroids whose orbits mimic Vesta's. Scientists have supposed that these asteroids were once blasted from Vesta's surface, and that fragments of Vesta occasionally escape from the asteroid belt into the inner solar system. But it wasn't until last year, when Vesta made its nearest Earth approach in a decade, that Hubble could hope to resolve any crater left over from the impact that spawned the asteroids and meteorites. Vesta is the only minor planet that brightens to naked-eye visibility. It will reach opposition in October, but at the moment, it is magnitude 7.0 and located near the Pisces-Cetus border.

# Kid Quotes

Submitted via the Internet

The beguiling ideas about science quoted here were gleaned from essays, exams, and classroom discussions. Most were from 5th and 6th graders. They illustrate Mark Twain's contention that the "most interesting information comes from children, for they tell all they know and then stop."

Question: What is one horsepower? Answer: One horsepower is the amount of energy it takes to drag a horse 500 feet in one second.

You can listen to thunder after lightening and tell how close you came to getting hit. If you don't hear it you got hit, so never mind.

Talc is found on rocks and on babies.

The law of gravity says no fair jumping up without coming back down.

When they broke open molecules, they found they were only stuffed with atoms. But when they broke open atoms, they found them stuffed with explosions.

When people run around and around in circles we say they are crazy. When planets do it we say they are orbiting.

Rainbows are just to look at, not to really understand.

Someday we may discover how to make magnets that can point in any direction.

South America has cold summers and hot winters, but somehow they still manage.

Most books now say our sun is a star. But it still knows how to change back into a sun in the daytime.

Water freezes at 32 degrees and boils at 212 degrees. There are 180 degrees between freezing and boiling because there are 180 degrees between north and south.

A vibration is a motion that cannot make up its mind which way it wants to go.

There are 26 vitamins in all, but some of the letters are yet to be discovered. Finding them all means living forever.

There is a tremendous weight pushing down on the center of the Earth because of so much population stomping around up here these days.

Lime is a green-tasting rock.

Many dead animals in the past changed to fossils while others preferred to be oil.

Genetics explain why you look like your father and if you don't why you should.

Vacuums are nothings. We only mention them to let them know we know they're there.

Some oxygen molecules help fires burn while others help make water, so sometimes it's brother against brother.

Some people can tell what time it is by looking at the sun. But I have never been able to make out the numbers.

We say the cause of perfume disappearing is evaporation. Evaporation gets blamed for a lot of things people forget to put the top on.

To most people solutions mean finding the answers. But to chemists solutions are things that are still all mixed up.

In looking at a drop of water under a microscope, we find there are twice as many H's as O's.

Clouds are high flying fogs.

I am not sure how clouds get formed. But the clouds know how to do it, and that is the important thing.

Clouds just keep circling the earth around and around. And around. There is not much else to do.

Cyanide is so poisonous that one drop of it on a dogs tongue will kill the strongest man.

A blizzard is when it snows sideways.

A monsoon is a French gentleman.

Thunder is a rich source of loudness.

Isotherms and isobars are even more important than their names sound.

It is so hot in some places that the people there have to live in other places.

The wind is like the air, only pushier.

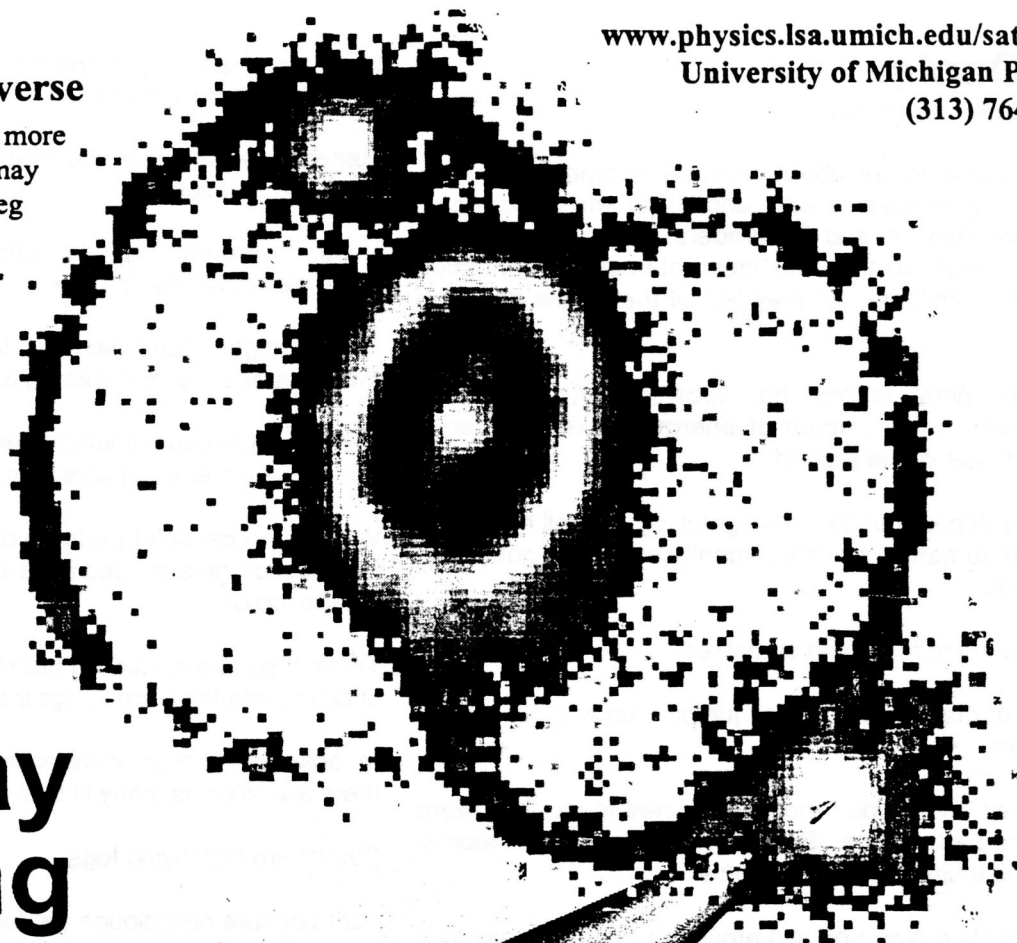
*"For the best low-power views, use the highest power that frames the subject. For the best high-power views, use the lowest power that reveals the detail you're looking for."*

Al Nagler from May 1991 Sky & Telescope

**Oct. 11, 18, & 25:  
The Fate of the Universe**

Even though the universe is more than 10 billion years old, it may still be in its infancy. Dr. Greg Laughlin will explore the history and long-term evolution of the Earth, Sun, stars, galaxy, and the cosmos itself. Looking into the strange realities of the extremely distant future, we gain a new perspective on the transient nature of the present.

[www.physics.lsa.umich.edu/saturday](http://www.physics.lsa.umich.edu/saturday)  
University of Michigan Physics  
(313) 764-4437



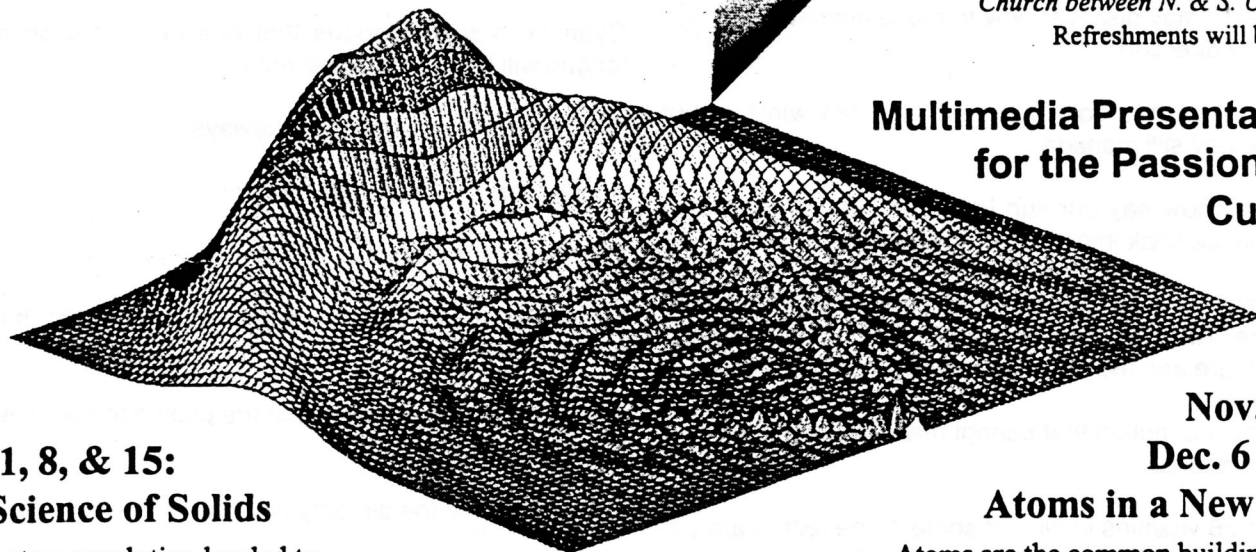
**Saturday  
Morning  
PHYSICS**

**10:30 to 11:30 A.M.**

**170 Dennison Bldg.**

*Church between N. & S. University*  
Refreshments will be served

**Multimedia Presentations  
for the Passionately  
Curious**



**Nov. 1, 8, & 15:  
The Science of Solids**

The quantum revolution has led to an understanding of bulk matter as a collection of interacting atoms. Dr. John Erland will introduce the physics of “condensed matter”—how solids’ properties, from texture to transparency, can be understood from the atomic model, and how this understanding is bringing us custom materials, nano-machines, and the control of quantum states.

**Nov. 22 &  
Dec. 6 & 13:**

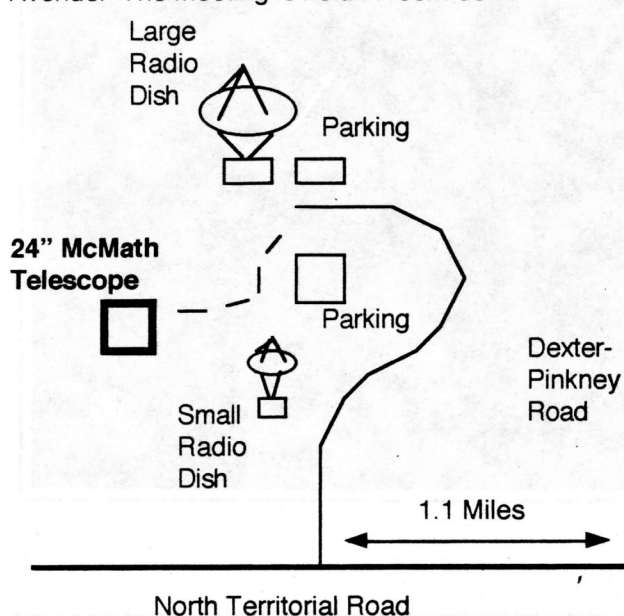
**Atoms in a New Light**

Atoms are the common building blocks of matter in the world around us. This concept, as old as ancient Greece, led to the discovery of quantum mechanics and of the wave-particle nature of matter and light. Dr. John Yukich will introduce the fundamentals of atomic physics, will explain how we study and manipulate atoms via their interaction with light, and will explore such promising areas of research as atom trapping and wave-function engineering.



## 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.



**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.

**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.

**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!

**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.

## 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 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*: \$27 / 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 Newsletter Editor Kurt Hillig at (313)663-8699(h) or (313)647-2867(o) or e-mail to khillig@umich.edu to discuss length and format. Announcements and articles are due by the first Friday of each month. Articles should be mailed to Kurt at:

7654 W. Ellsworth Road  
Ann Arbor, MI 48103

## Telephone Numbers:

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## Lowbrow's WWW Home Page:

<http://www.astro.lsa.umich.edu/lowbrows.html>

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## Monthly Meeting : October 17, 1997 at 7:30 pm

Room 807 Dennison Hall (Physics & Astronomy Building) at The University of Michigan

### Supernovae & Black Holes

This is the first direct look, in visible light, at a lone neutron star, as seen by NASA's Hubble Space Telescope. The Hubble results show the star is very hot (1.2 million degrees Fahrenheit at the surface), and can be no larger than 16.8 miles (28 kilometers) across. These results prove that the object must be a neutron star, because no other known type of object can be this hot, small, and dim (below 25th magnitude). Astronomers haven't directly measured the neutron star's distance, but fortunately the neutron star lies in front of a molecular cloud known to be about 400 light-years away in the southern constellation Corona Australis. Credit: Fred Walter (State University of New York at Stony Brook), and NASA



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University Lowbrow Astronomers  
3684 Middleton drive  
Ann Arbor, Michigan 48105

Check your membership expiration  
date on the mailing label !