

Inside Orbit

January 2008

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A Publication of the Grand Rapids Amateur Astronomical Association



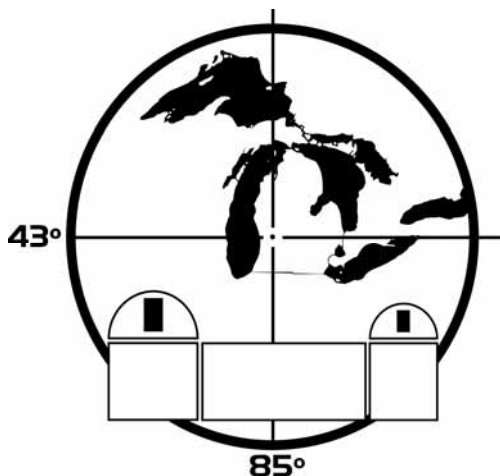
*There is hope for the future.
When the world is ready for a
new and better life, all this will
someday come to pass, in God's
good time."*

*Jules Verne
(Captain Nemo, 20,000
Leagues Under the Sea)*

In This Issue:

- ☆ Calendar of Events & News Notes
- ☆ The Solar System, January 2008
- ☆ NASA's Space Place





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Grand Rapids Amateur
Astronomical Association

In This Issue:

Calendar of Events & News Notes

Happenings in the GRAAA and the astronomical community

The Solar System - January 2008by Jeff Kozarski

Can I see Jupiter yet? What about Saturn? This is the article for you

NASA's Space Place - "Ultraviolet Surprise"

The wonders of the world of science and technology, brought to you by NASA and the Jet Propulsion Laboratory

Note: Any views and opinions expressed by the authors in this publication are not necessarily those of the GRAAA or its members.

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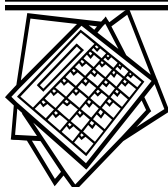
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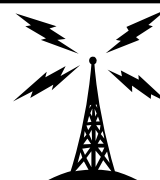
Aurora Borealis over Veen Observatory (*courtesy Kevin Jung*)

Launch of Explorer 1 in January 1958 (*JPL*)



News and Events

(Latest News and Events always online
at www.graaa.org)



MEETINGS: We will be starting to have regular monthly meetings again, beginning the first Saturday of February. Stay tuned for program, time, and location.

GRAAA ONLINE FORUM: Just a reminder of the forum for club members. You can find a link to the Forum in the Members' Section of the website.

FEBRUARY INSIDE ORBIT: The deadline for submissions to the February 2008 *Inside Orbit* is January 22nd. If you'd like to write anything, please feel free to do so. The editorial staff is very relaxed concerning submissions, and take anything that's remotely interesting. In fact, they will almost guarantee that it will be published.

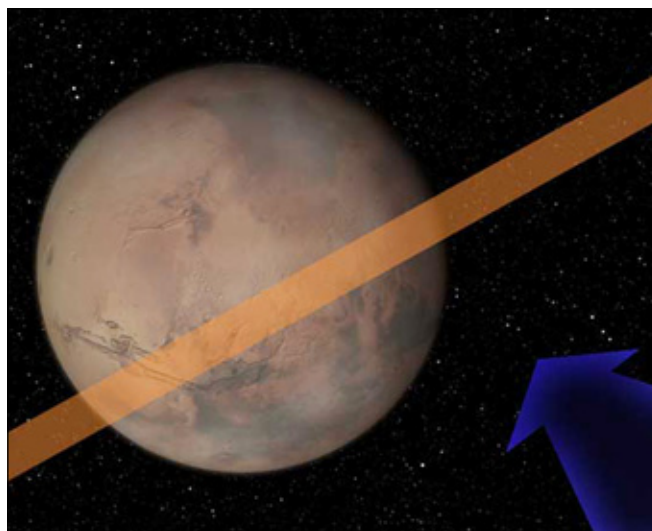
THE YEARS' BEST PHOTOS: Astronomy Picture of the Day (APOD) has come out with its list of the Astronomy Pictures of the Year. These include images from Mars, Saturn, and a couple of comets. Make sure to check out their selection - antwrp.gsfc.nasa.gov/apod/apoys2007.html

FIFTY YEARS AGO - THE BEGINNING OF U.S. SPACE EXPLORATION: *Explorer 1* was the first satellite launched by the United States when it was sent into space on January 31, 1958. Following the launch of the Soviet Union's *Sputnik 1* on October 4, 1957, the U.S. Army Ballistic Missile Agency was directed to launch a satellite using its Jupiter C rocket developed under the direction of Dr. Wernher von Braun. The Jet Propulsion Laboratory received the assignment to design, build and operate the artificial satellite that would serve as the rocket's payload. JPL completed this job in less than three months.

The successful launch of *Explorer 1* marked the beginning of a half-century of space exploration. By late 1958, JPL was transferred to the newly created National Aeronautics and Space Administration. JPL manages 19 spacecraft and six instruments that are currently exploring our home planet, our solar system and the larger universe.

MARS IMPACT PROBABILITY INCREASES TO 4 PERCENT: The impact probability for a collision of asteroid 2007 WD5 with Mars on January 30 has increased from 1.3% to 3.9%.

Pre-discovery observations of asteroid 2007 WD5, taken on November 8, 2007 have allowed its orbit to be refined and the uncertainties for the late January Mars encounter have been improved. The impact probability resulting from the recent orbit refinement has increased to a surprising 3.9% (about 1 in 25 odds). The uncertainty region during the Mars encounter now extends over 400,000 km along a very narrow ellipsoid that is only 600 km wide. Since the uncertainty region intersects Mars itself, a Mars impact is still possible. However, the most likely scenario is that additional observations of the asteroid will allow the uncertainty region to shrink so that a Mars impact is ruled out. In the unlikely event of an impact, the time would be 2008 January 30 at 10:56 UT (2:56 a.m. PST) with an uncertainty of a few minutes.



ASTRONOMERS MONITOR ASTEROID TO PASS NEAR MARS: Astronomers funded by NASA are monitoring the trajectory of an asteroid estimated to be 50 meters (164 feet) wide that is expected to cross Mars' orbital path early next year. Observations provided by the astronomers and

analyzed by NASA's Near-Earth Object Office at the Jet Propulsion Laboratory in Pasadena, Calif., indicate the object may pass within 30,000 miles of Mars at about 6 a.m. EST (3 a.m. PST) on Jan. 30, 2008.

"Right now asteroid 2007 WD5 is about half-way between Earth and Mars and closing the distance at a speed of about 27,900 miles per hour," said Don Yeomans, manager of the Near Earth Object Office at JPL. *"Over the next five weeks, we hope to gather more information from observatories so we can further refine the asteroid's trajectory."*

THE UNITED NATIONS DECLARES 2009 THE INTERNATIONAL YEAR OF ASTRONOMY: the United Nations (UN) 62nd General Assembly proclaimed 2009 the International Year of Astronomy. The Resolution was submitted by Italy, Galileo Galilei's home country. The International Year of Astronomy 2009 is an initiative of the International Astronomical Union and UNESCO.

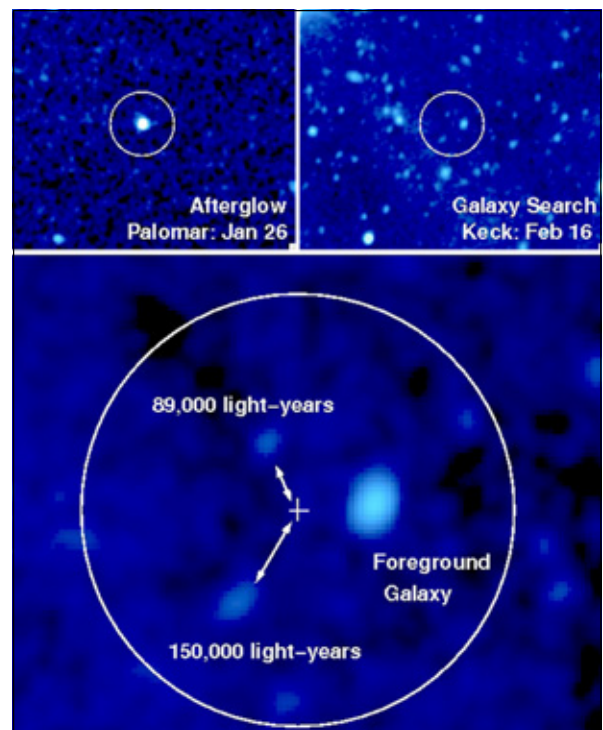
The International Year of Astronomy 2009 (IYA2009) celebrates the first astronomical use of the telescope by Galileo – a momentous event that initiated 400 years of astronomical discoveries and triggered a scientific revolution which profoundly affected our worldview. Now telescopes on the ground and in space explore the Universe, 24 hours a day, across all wavelengths of light. The President of the International Astronomical Union (IAU) Catherine Cesarsky says: *"The International Year of Astronomy 2009 gives all nations a chance to participate in this ongoing exciting scientific and technological revolution."*

SANDIA SUPERCOMPUTERS OFFER NEW EXPLANATION OF TUNGUSKA DISASTER: The stunning amount of forest devastation at Tunguska a century ago in Siberia may have been caused by an asteroid only a fraction as large as previously published estimates, Sandia National Laboratories supercomputer simulations suggest.

"The asteroid that caused the extensive damage was much smaller than we had thought," says Sandia principal investigator Mark Boslough of the impact of June 30, 1908. *"That such a small object can do this kind of destruction suggests that smaller asteroids are something to consider. Their smaller size indicates such collisions are not as improbable as we had believed."*



'SHOT IN THE DARK' STAR EXPLOSION STUNS ASTRONOMERS: A team of astronomers has discovered a cosmic explosion that seems to have come from the middle of nowhere — thousands of light-years from the nearest galaxy-sized collection of stars, gas, and dust. This "shot in the dark" is surprising because the type of explosion, a long-duration gamma-ray burst (GRB), is thought to be powered by the death of a massive star.



"Here we have this very bright burst, yet it's surrounded by darkness on all sides," says Brad Cenko of the California Institute of Technology, Pasadena, Calif., lead author of the team's paper, which has been accepted for publication in The Astrophysical Journal. "The nearest galaxy is more than 88,000 light-years away, and there's almost no gas lying between the burst and Earth."

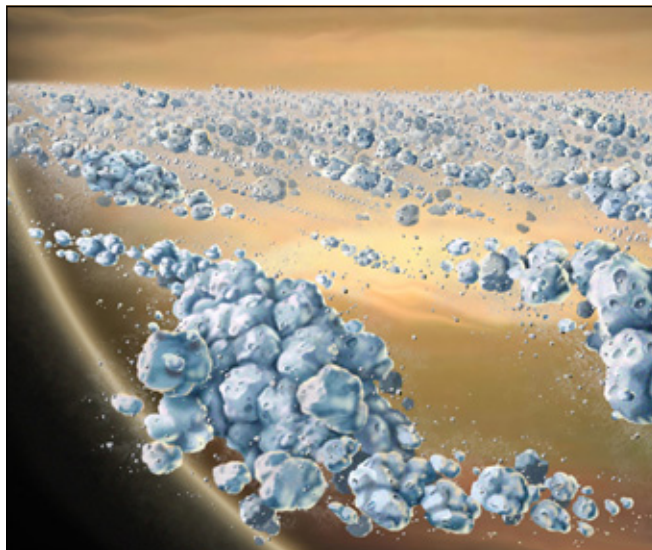
NASA SPACECRAFT MAKE NEW DISCOVERIES ABOUT NORTHERN LIGHTS: A fleet of NASA spacecraft, launched less than eight months ago, has made three important discoveries about spectacular eruptions of Northern Lights called "substorms" and the source of their power.



NASA's Time History of Events and Macroscale Interactions during Substorms (*THEMIS*) mission observed the dynamics of a rapidly developing substorm, confirmed the existence of giant magnetic ropes and witnessed small explosions in

the outskirts of Earth's magnetic field. The findings will be presented at the annual meeting of the American Geophysical Union in San Francisco in December.

SATURN'S RINGS MAY BE OLD TIMERS: New observations by NASA's *Cassini* spacecraft indicate the rings of Saturn, once thought to have formed during the age of the dinosaurs, instead may have been created roughly 4.5 billion years ago, when the solar system was still under construction.



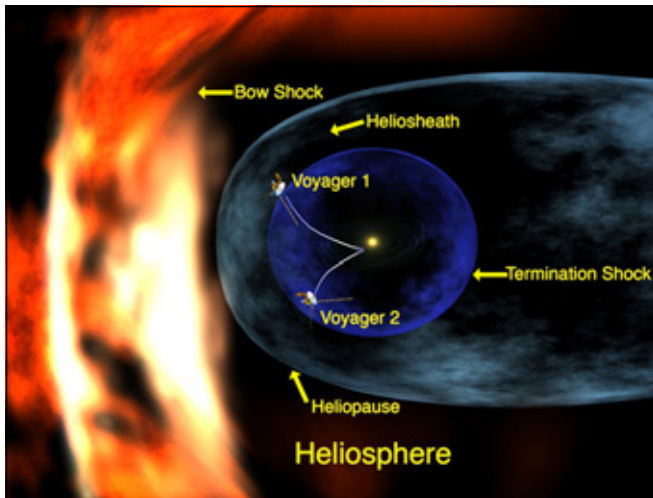
Larry Esposito, principal investigator for *Cassini*'s Ultraviolet Imaging Spectrograph at the University of Colorado, Boulder, said data from NASA's *Voyager* spacecraft in the 1970s, and later from NASA's *Hubble Space Telescope*, led scientists to believe Saturn's rings were relatively youthful and likely created by a comet that shattered a large moon, perhaps 100 million years ago.

MARS ROVER INVESTIGATES SIGNS OF STEAMY MARTIAN PAST: Researchers using NASA's twin Mars rovers are sorting out two possible origins for one of Spirit's most important discoveries, while also getting Spirit to a favorable spot for surviving the next Martian winter.

The puzzle is what produced a patch of nearly pure silica -- the main ingredient of window glass -- that Spirit found last May. It could have come from either a hot-spring environment or an environment called a fumarole, in which acidic steam

risers through cracks. On Earth, both of these types of settings teem with microbial life.

VOYAGER 2 PROVES SOLAR SYSTEM IS SQUASHED: NASA's *Voyager 2* spacecraft has followed its twin, *Voyager 1*, into the solar system's final frontier, a vast region at the edge of our solar system where the solar wind runs up against the thin gas between the stars.



However, *Voyager 2* took a different path, entering this region, called the heliosheath, on Aug. 30, 2007. Because *Voyager 2* crossed the heliosheath boundary, called the solar wind termination shock, about 16 billion kilometers (10 billion miles) away from *Voyager 1* and almost 1.6 billion kilometers (a billion miles) closer to the sun, it confirmed that our solar system is "squashed" or "dented"—that the bubble carved into interstellar space by the solar wind is not perfectly round. Where *Voyager 2* made its crossing, the bubble is pushed in closer to the sun by the local interstellar magnetic field.

NEW NASA MISSION TO REVEAL MOON'S INTERNAL STRUCTURE AND EVOLUTION: At a Monday, Dec. 10 meeting of the American Geophysical Union, NASA's Associate Administrator for Science Alan Stern announced the selection of a new mission that will peer deep inside the moon to reveal its anatomy and history.

The Gravity Recovery and Interior Laboratory, or Grail, mission is a part of NASA's Discovery Program. It will cost \$375 million and is scheduled to launch in 2011. Grail will fly twin spacecraft in tandem orbits around the moon for several months to measure its gravity field in unprece-

dent detail. The mission also will answer long-standing questions about Earth's moon and provide scientists a better understanding of how Earth and other rocky planets in the solar system formed.

THE SUN IS BRISTLING WITH X-RAY JETS: Astronomers using Japan's *Hinode* spacecraft have discovered that the sun is bristling with powerful "X-ray jets." They spray out of the sun's surface hundreds of times a day, launching blobs of hot gas as wide as North America at a top speed of two million miles per hour. These jets add significant mass to the solar wind and they may help explain a long-standing mystery of astrophysics: the superheating of the sun's corona.

"This is awesome and very much unexpected," says Jonathan Cirtain of the Marshall Space Flight Center who was a key figure in the discovery. He recalls how it happened: "We found them a year ago in Nov. 2006. *Hinode* had just been launched and its instruments were coming online." To calibrate the spacecraft's X-ray Telescope, mission controllers in Japan pointed the telescope at a dark hole in the sun's atmosphere—a "coronal hole." Cirtain analyzed the data and "there they were!"

MUSIC TO OBSERVE BY? Some astronomers have put together a little song about observing at Mauna Kea, to the tune of the Eagles hit "Hotel California." Here is the link to "Hotel Mauna Kea" - www.youtube.com/watch?v=XPdTIHK1h_0

INFORMATION SPOT: Earth is the third planet from the Sun in the Solar System, and the planet on which people live. The Earth orbits the Sun at an average distance of 1.0 A.U. and has a mass of 6×10^{24} kg. It is made of solid, rocky materials such as iron, nickel, and silicon, and it has an atmosphere composed mainly of nitrogen, oxygen, argon, and carbon dioxide. Liquid water oceans cover 75% of the planet's surface. Earth has one moon.

...news to be continued next month



The Solar System: January, 2008

by Jeff Kozarski

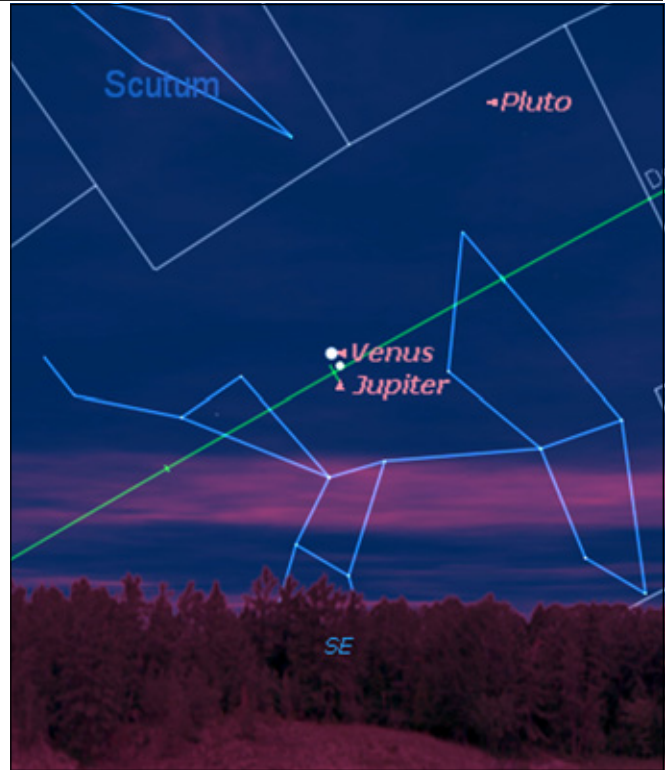
January skies highlight bright Mars high in the south during the mid evenings hours. Saturn is also rising earlier each evening in the east. Jupiter returns to the morning sky and closes in on brilliant Venus at the end of the month.

Mercury returns to the evening sky this month reaching greatest elongation on the 22nd. It will be somewhat favorably placed in the evening sky 45 minutes after sunset 7° up in the WSW sky that evening. Mercury shines bright at -0.4 magnitude that evening.



Mercury at greatest elongation on the 22nd.

Venus begins the New Year in the morning sky in Scorpio moving into Sagittarius on the 21st. It moves closer to Jupiter & has a conjunction with it on February 1st. Venus is still a dazzling -4.0 magnitude object, compared to Jupiter at -1.8 mag.



Venus & Jupiter are only $35'$ of arc from each other on the morning of February 1st, 11° up a half-hour before sunrise.

January 2008 Lunar Data:

- ☆ New Moon on the 8th at 6.37am EST
- ☆ First Quarter on the 15th at 2.46pm EST
- ☆ Full Moon on the 22nd at 8.43am EST
- ☆ Last Quarter on the 30th at 12.03am EST

Mars was at opposition last month in Gemini. Retrograde motion ends on the 31st and Mars resumes forward motion again. Mars' large retrograde loop has it all the way back into Taurus for this month close to one of stars representing Taurus' horns. This is probably the last month for favorable telescopic observations of the Red Planet as the disc slips below $12''$ of arc by the 1st of February. Mars is still a bright object visually, its magnitude dropping from -1.47 on New

Years Day to -0.6 on the 31st.

Mars transits very high at 72° at 10:42 p.m. at mid-month.

Jupiter was in conjunction with the Sun late last month. It will slowly return to the morning sky after the 20th or so when it'll be very low in the SE a half-hour before sunrise. Jupiter is now in Sagittarius and will be more prominent next month.

Saturn will be at opposition next month. It is currently in Leo mid-month and rises around 9 p.m. EST. Through a telescope Saturn is a real gem, its disc measures nearly $20''$ of arc. Visually, Saturn is only $+0.4$ magnitude, down a little from a few years ago when its rings were more open to us.

Uranus will be in conjunction with the Sun early in March in Aquarius and will be briefly visible after sunset this month.

Neptune is in conjunction with Sun on February 11th in Capricornus. It is essentially lost in the solar glare this month & next.

Oppositions for 2008:

Saturn -- February 24th

Juno -- June 13th

Pluto -- June 20th

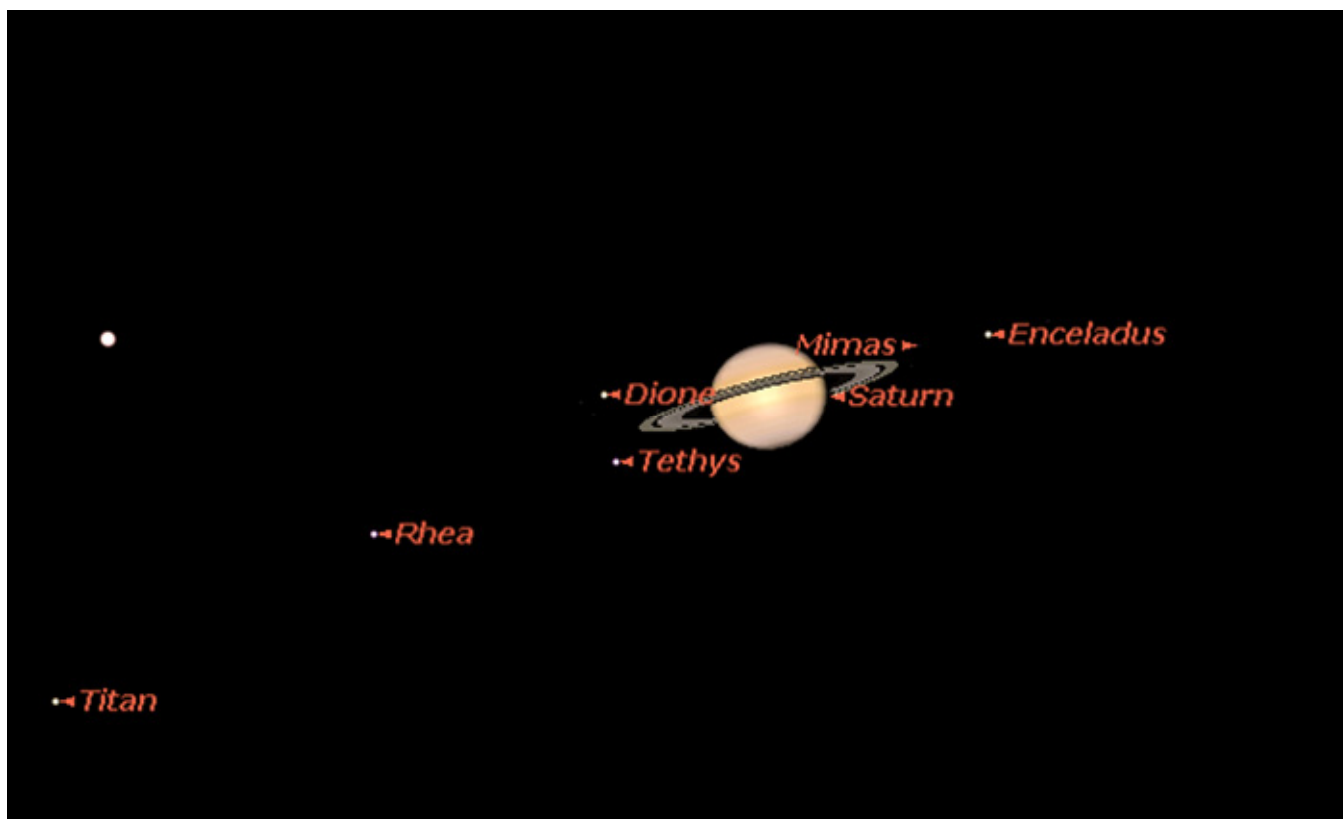
Jupiter -- July 9th

Neptune -- August 15th

Uranus -- September 13th

Vesta -- November 1st

Pallas -- December 10th



Saturn & its moons on the 16th. Note the rings are not as open as they were a few years ago.

Note: These articles are courtesy NASA Space Place Program at the Jet Propulsion Laboratory.

Ultraviolet Surprise

by Patrick L. Barry and Tony Phillips

How would you like to visit a universe full of exotic stars and weird galaxies the likes of which astronomers on Earth have never seen before?

Now you can. Just point your web browser to galex.stsci.edu and start exploring.

That's the address of the Galaxy Evolution Explorer image archive, a survey of the whole sky at ultraviolet wavelengths that can't be seen from the ground. Earth's atmosphere blocks far-ultraviolet light, so the only way to see the ultraviolet sky is by using a space telescope such as NASA's Galaxy Evolution Explorer.

About 65% of the images from the all-sky survey haven't been closely examined by astronomers yet, so there are plenty of surprises waiting to be uncovered.

"The Galaxy Evolution Explorer produces so much data that, beyond basic quality control, we just don't have time to look at it all," says Mark Seibert, an astronomy postdoc at the Observatories of the Carnegie Institution of Washington in Pasadena, California.

This fresh view of the sky has already revealed striking and unexpected features of familiar celestial objects. Mira is a good example. Occasionally visible to the naked eye, Mira is a pulsating star monitored carefully by astronomers for more than 400 years. Yet until Galaxy Evolution Explorer recently examined Mira, no one would have guessed its secret: Mira possesses a comet-like tail 13 light-years long.

"Mira shows us that even well-observed stars can surprise us if we look at them in a different way and at different frequencies," Seibert says.

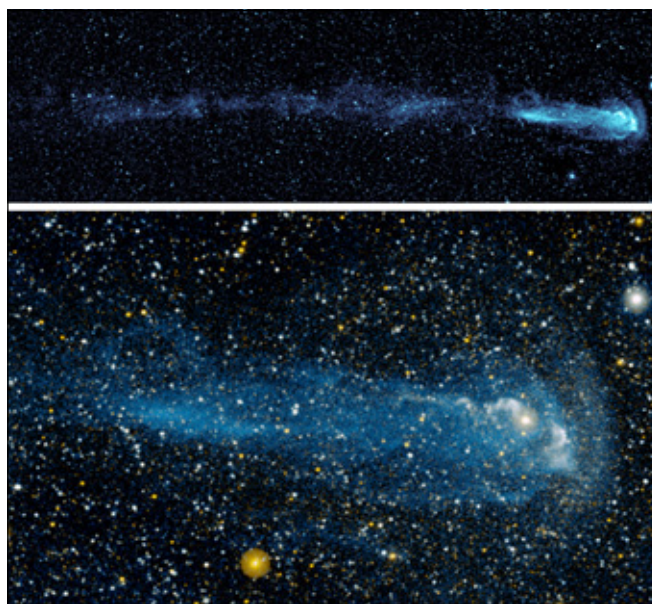
Another example: In April, scientists announced that galaxies such as NGC 1512 have giant ultraviolet spiral arms extending three times farther out into space than the arms that can be seen by visible-light telescopes. It would be like looking at your pet dog through an ultra-

violet telescope and discovering his ears are really three times longer than you thought!

The images from the ultraviolet space telescope are ideal for hunting new phenomena. The telescope's small, 20-inch primary mirror (not much bigger than a typical backyard telescope) offers a wide field of view. Each image covers 1.2 degrees of sky—lots of territory for the unexpected.

If someone combing the archives does find something of interest, Seibert advises that she or he should first search astronomy journals to see whether the phenomenon has been observed before. If it hasn't, email a member of the Galaxy Evolution Explorer science team and let them know, Seibert says.

So what are you waiting for? Fire up your web browser and let the discoveries begin!



Astronomers looking at new ultraviolet images from the Galaxy Evolution Explorer spacecraft were surprised to discover a 13-light-year long tail on Mira, a star that has been extensively studied for 400 years.

**Grand Rapids Amateur Astronomical Association
Membership Application or Renewal Form**

DATE: _____

☐ **New Membership** ☐ **Renewal**

Please fill out the information below as completely as possible.
For Family memberships, please include all persons for whom membership is desired.

Please Print

Name: _____ Birthdate: _____

Name: _____ Birthdate: _____

Name: _____ Birthdate: _____

Name: _____ Birthdate: _____

Name: _____ Birthdate: _____

Name: _____ Birthdate: _____

Address: _____

City: _____ State: _____ Zip: _____

Home Phone: _____ Cell Phone: _____

E-Mail: _____

(Note: For Family members, if more than one e-mail address, please list others on back of application)

☐ **Adult** (18 or older, a Minimum of \$40.00) \$ _____

☐ **Student** (through 17 yrs old, a Minimum of \$25.00) \$ _____

☐ **Family** (all members of one family, a Minimum of \$50.00) \$ _____

(Note: Contributions greater than the minimum dues are considered a donation and are tax-deductible)

☐ **Observatory Endowment Fund** \$ _____

☐ **Miscellaneous Donations** \$ _____

(Note: Contributions to these funds are tax-deductible. Indicate amount of donation)

☐ **OBSERVATORY USER FEE:** (a Minimum of \$25.00 per user) \$ _____

(Contributions of more than \$25 will help meet repairs and upgrade of equipment costs.)

If you are a qualified user of the Veen Observatory, and wish to remain so,
check the box for **"User Fee."**

TOTAL ENCLOSED (From all categories above) \$ _____

Make Check or Money Order to:

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