SKYWATCHER

THE NEWS LETTER OF THE GUILDFORD ASTRONOMICAL SOCIETY

http://www.guildfordas.org/

FROM THE EDITOR…..

Well the weather was a little better last month, but due to my little boy being unwell I was unable to do any observing.
If you can remember the last meeting, I asked you all if you have anything of interest that you would like to see in Skywatcher please send it to me and I will pop it in, well I did NOT receive one item from anyone and I am a little disappointed to report this?
I will ask one more time, if there is anything you would like to put into Skywatcher, then please send it to me, Thank You.

Well with that off my chest there is not much else to report on, so that's it from me?

Clear skies to you all

Neil Ross
Editor

FOR SALE

Meade 2080 8 inch SCT with wedge, field tripod and dew shield. Good condition. £350
If anyone is interested, give me a call on 07881 523287

SEE PICTURES ON OTHER SIDE

Forthcoming Meetings

May 5th

Dr Helen Walker
" Infrared Astronomy"

June 2nd

Professor Carl Murray
"Saturn's Rings:
The View From Cassini"

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21 February 2005

BOOKS

Title	Author	Author	Publisher	Year of Publication	Date Purchased	Cost £
The Mariner 6 and 7 pictures of mars	Stewart A.	Collins		1971		
The Backyard Astronomers Guide		Dickinson & Dyer				
Surface of the moon: Its structure and origin	V.A.	Firsoff		1961		
Government Support for Beagle 2.	House of Commons Science & Technology Committee			Nov 04		
Frozen star, of Pulsars, black holes and the fate of stars	George	Greenstein		1984		
Observing the Universe (A new Scientist Guide)	Nigel	Henbest (editor)		1984		
100 billion suns, the birth, life and death of the stars	Rudolf	Kippenhahn		1983		
Skywatching	David	Levy				
The Universe		Life Nature Library		1970		
Larousse Encyclopedia of Astronomy		Larousse		1966		
The Modern Universe	Raymond A. Lyttle	Lyttleton		1957		
1973 Year Book of Astronomy	Patrick	Moore		1973		
1975 Year Book of Astronomy	Patrick	Moore		1975		
1976 Year Book of Astronomy	Patrick	Moore		1976		
1979 Year Book of Astronomy	Patrick	Moore		1979		
1980 Year Book of Astronomy	Patrick	Moore		1980		
1982 Year Book of Astronomy	Patrick	Moore		1982		
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1994 Year Book of Astronomy	Patrick	Moore		1994		
1995 Year Book of Astronomy	Patrick	Moore		1995		
1996 Year Book of Astronomy	Patrick	Moore		1996		
1997 Year Book of Astronomy	Patrick	Moore		1997		
A textbook of Astronomy, Facts and feats	Patrick	Moore		1979		
Earth Satellite, The new satellite projects explained	Patrick	Moore		1955		
Moon Flight atlas	Patrick	Moore		1970		
Travellers in Space and time	Patrick	Moore		1983		
1989 Year Book of Astronomy	Patrick	Moore		1989		
Guide to Astronomy	James	Muirden		1972		
Analysis of Apollo 10 photography and visual observations		NASA		1971		
ATLAS of surveyor 5 Television data		NASA		1974		
Guide to Lunar Orbiter Photographs		NASA		1970		
The Moon as viewed by lunar orbiter		NASA		1970		
Answer book of astronomy	Iain	Nicholson		1975		
Lonely Hearts of the Universe	Dennis	Overbye		1991	Oct 04	gift
Concise Encyclopedia of Astronomy	A. and H.	Wigert & Zimmermann				
ITALY in Space before and after SIRIO				1978		
Moon, Mars and Venus. A concise guide in colour				1976		
Messier Objects: A Beginner's Guide	Kathy & Sue	Machin & Wheatley	Astronomical Leagu	1997	6 Feb 2004	£5.00
Turn Left at Orion: 100 objects to see in a small telescope	Guy & Dan	Consolmagno & Davis	Cambridge UP	2000 3rd ed	6 Feb 2004	£15.00
Caldwell Card	Sky & Telescope	Sky & Telescope	Sky & Telescope	2001	6 Feb 2004	£3.00
Messier Card	Sky & Telescope	Sky & Telescope	Sky & Telescope	2003	6 Feb 2004	£3.00
Astronomy Encyclopedia	Gen: Patrick Moore		Phillip's	2002	6 Feb 2004	£30.00
Moonwatch			Phillip's	2003	6 Feb 2004	£12.99
Webb Society Deep-Sky Observer's Handbook - Star Atlas (#1)	Webb Society		Webb Society	2002	6 Feb 2004	£15.00
Webb Society Deep-Sky Observer's Handbook - Star Atlas (#2)	Webb Society		Webb Society	2002	6 Feb 2004	£15.00
Philips Planisphere 10" Lat 51.5º North	Springer Verlag					
Observatrional Astronomy: A Plan for the Beginner	S J	Lubbock	Fed of Astro Soc	1987 rev 2001	4 Feb 2005	£2.20
Exploring Mars: An Astronomy Now Guide	Neil	English	Pole Star Publicatio	2004	4 Feb 2005	£8.99
Just Six Numbers: The Deep Forces that Shape the Universe	Martin	Rees	Phoenix	2004	11 Feb 2005	£5.59
The Edge of Infinity: Supermassive Black Holes in the Universe	Fulvio	Melia	Cambridge UP	2003	11 Feb 2005	£13.29

If interested in any of the above books please speak to David Reynolds

Station gyro experiences unusual vibration

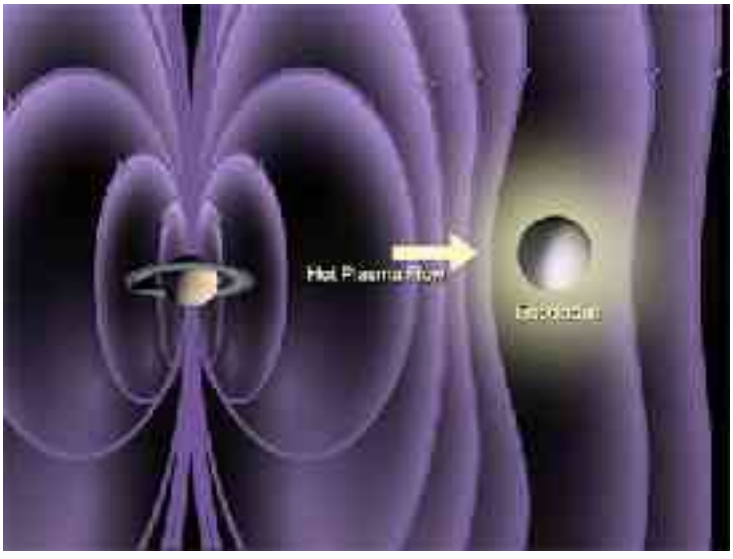
BY WILLIAM HARWOOD
STORY WRITTEN FOR CBS NEWS "SPACE PLACE" & USED WITH PERMISSION
Posted: March 28, 2005

About five minutes after space station commander Leroy Chiao and Salizhan Sharipov wrapped up a successful early morning spacewalk, one of the station's two operational control moment gyroscopes, used to stabilized the complex and change its orientation, experienced an unusually high vibration.
One official said the vibration in CMG-3 was "an order of magnitude" higher than any such event in the past and engineers are studying data to determine what might have happened and what, if anything, might be wrong.
The station is equipped with four control moment gyros, but CMG-1 failed in 2002 and CMG-2 went off line March 16 when a circuit breaker malfunctioned. Spacewalkers aboard the shuttle Discovery plan to restore CMG-2 to operation in May by re-routing power to the gyro during an already planned spacewalk. CMG-1 will be replaced during another spacewalk.
Control moment gyroscopes are used to maintain the station's orientation without using Russian thrusters that rely on limited supplies of on-board rocket fuel. Officials said today that even a third gyro failure likely would have no impact on Discovery's mission because the shuttle would have more than enough fuel on board to maintain the station's attitude, if necessary, while CMGs 1 and 2 are brought back on line. And in any case, CMG-3 remains fully operational.
As usual during spacewalks involving the Russian segment of the station, the lab complex was allowed to freely drift while the spacewalkers worked at the aft end of the Russian command module. The thrusters were activated after the work was done to restore the proper orientation.
Engineers were planning to switch control back to the gyros after the spacewalk ended when the "vibrational event" was detected. Playing it safe, flight controllers opted to maintain control using the thrusters until just after noon. As of this writing, CMGs 3 and 4 are maintaining attitude while engineers study telemetry to determine the nature of the event.

Cassini finds an atmosphere on Saturn's moon Enceladus

CASSINI PHOTO RELEASE

Posted: March 16, 2005



This artist concept shows the detection of an atmosphere on Saturn's icy moon Enceladus. The Cassini magnetometer instrument is designed to measure the magnitude and direction of the magnetic fields of Saturn and its moons. During Cassini's two close flybys of Enceladus--Feb. 17 and March 9--the instrument detected a bending of the magnetic field around Enceladus. Credit: NASA/JPL
Download larger image version

The Cassini spacecraft's two close flybys of Saturn's icy moon Enceladus have revealed that the moon has a significant atmosphere. Scientists, using Cassini's magnetometer instrument for their studies, say the source may be volcanism, geysers, or gases escaping from the surface or the interior.

When Cassini had its first encounter with Enceladus on Feb. 17 at an altitude of 1,167 kilometers (725 miles), the magnetometer instrument saw a striking signature in the magnetic field. On March 9, Cassini approached to within 500 kilometers (310 miles) of Enceladus' surface and obtained additional evidence.

The observations showed a bending of the magnetic field, with the magnetospheric plasma being slowed and deflected by the moon. In addition, magnetic field oscillations were observed. These are caused when electrically charged (or ionized) molecules interact with the magnetic field by spiraling around the field line. This interaction creates characteristic oscillations in the magnetic field at frequencies that can be used to identify the molecule. The observations from the Enceladus flybys are believed to be due to ionized water vapour.

"These new results from Cassini may be the first evidence of gases originating either from the surface or possibly from the interior of Enceladus," said Dr. Michele Dougherty, principal investigator for the Cassini magnetometer and professor at Imperial College in London. In 1981, NASA's Voyager spacecraft flew by Enceladus at a distance of 90,000 kilometers (56,000 miles) without detecting an atmosphere. It's possible detection was beyond Voyager's capabilities, or something may have changed since that flyby.

This is the first time since Cassini arrived in orbit around Saturn last summer that an atmosphere has been detected around a moon of Saturn, other than its largest moon, Titan. Enceladus is a relatively small moon. The amount of gravity it exerts is not enough to hold an atmosphere very long. Therefore, at Enceladus, a strong continuous source is required to maintain the atmosphere.

The need for such a strong source leads scientists to consider eruptions, such as volcanoes and geysers. If such eruptions are present, Enceladus would join two other such active moons, Io at Jupiter and Triton at Neptune. "Enceladus could be Saturn's more benign counterpart to Jupiter's dramatic Io," said Dr. Fritz Neubauer, co-investigator for the Cassini magnetometer, and a professor at the University of Cologne in Germany.

Since the Voyager flyby, scientists have suspected that this moon is geologically active and is the source of Saturn's icy E ring. Enceladus is the most reflective object in the solar system, reflecting about 90 percent of the sunlight that hits it. If Enceladus does have ice volcanoes, the high reflectivity of the moon's surface might result from continuous deposition of icy particles originating from the volcanoes.

Enceladus' diameter is about 500 kilometers (310 miles), which would fit in the state of Arizona. Yet despite its small size, Enceladus exhibits one of the most interesting surfaces of all the icy satellites.

The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. The Jet Propulsion Laboratory, a division of the California Institute of Technology in Pasadena, manages the Cassini-Huygens mission for NASA's Science Mission Directorate, Washington, D.C. The Cassini orbiter was designed, developed and assembled at JPL.

Cassini captures greatest Saturn portrait yet

CASSINI PHOTO RELEASE

Posted: February 26, 2005

Credit: NASA/JPL/Space Science Institute

While cruising around Saturn, Cassini captured a series of images that have been composed into the largest, most detailed, global natural colour view of Saturn and its rings ever made.

This grand mosaic consists of 126 images acquired in a tile-like fashion, covering one end of Saturn's rings to the other and the entire planet in between. The images were taken over the course of 2 hours on Oct. 6, 2004, while Cassini was approximately 6.3 million kilometers (3.9 million miles) from Saturn. Since the view seen by Cassini during this time changed very little, no re-projection or alteration of any of the images was necessary.

Three images (red, green and blue) were taken each of 42 locations, or "footprints", across the planet. The full colour footprints were put together to produce a mosaic that is 8,888 pixels across and 4,544 pixels tall.

The smallest features seen here are 38 kilometers (24 miles) across. Many of Saturn's splendid features noted previously in single frames taken by Cassini are visible in this one detailed, all-encompassing view: Subtle colour variations across the rings, the thread-like F ring, ring shadows cast against the blue northern hemisphere, the planet's shadow making its way across the rings to the left, blue-grey storms in Saturn's southern hemisphere to the right and tiny Mimas and even smaller Janus (both faintly visible at lower left).

The Sun-Saturn-Cassini, or phase, angle at the time was 72 degrees; hence, the partial illumination of Saturn in this portrait. Later in the mission, when the spacecraft's trajectory takes it far from Saturn and also into the direction of the Sun, Cassini will be able to look back and view Saturn and its rings in a more fully-illuminated geometry.

The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. The Jet Propulsion Laboratory, a division of the California Institute of Technology in Pasadena, manages the Cassini-Huygens mission for NASA's Science Mission Directorate, Washington, D.C. The Cassini orbiter and its two onboard cameras were designed, developed and assembled at JPL. The imaging team is based at the Space Science Institute, Boulder, Colo.

Astronomers measure mass of smallest black hole

OHIO STATE UNIVERSITY NEWS RELEASE

Posted: February 22, 2005

A group led by astronomers from The Ohio State University and the Technion-Israel Institute of Technology have measured the mass of a unique black hole, and determined that it is the smallest found so far.

Early results indicate that the black hole weighs in at less than a million times the mass of our sun -- which would make it as much as 100 times smaller than others of its type.

To get their measurement, astronomers used NASA's Hubble Space Telescope and a technique similar to Doppler radar -- the method that meteorologists use to track weather systems.

The black hole lies 14 million light-years away, in the center of the galaxy NGC 4395. One light-year is the distance light travels in one year -- approximately six trillion miles.

Astronomers consider NGC 4395 to be an "active galaxy," one with a very bright center, or nucleus. Current theory holds that black holes may literally be consuming active galactic nuclei (AGNs). Black holes in AGNs are supposed to be very massive.

NGC 4395 appears to be special, because the black hole in the center of the galaxy is much smaller than those found in other active galaxies, explained Ari Laor, professor of astronomy at the Technion, in Haifa, Israel, and Brad Peterson, professor of astronomy at Ohio State.

While astronomers have found much evidence of black holes that are larger than a million solar masses or smaller than a few tens of solar masses, they haven't found as many midsize black holes -- ones on the scale of hundreds or thousands of solar masses.

Black holes such as the one in NGC 4395 provide a step in closing that gap.

Laor and Peterson and their colleagues used the Doppler radar-like technique to track the movement of gas around the center of NGC 4395. Whereas radar bounces a radio frequency signal off of an object, the astronomers observed light signals that naturally emanated from the center of the galaxy, and timed how long those signals took to reach the orbiting gas.

The method is called reverberation mapping, and Peterson's team is among a small number of groups who are developing it as a reliable means of measuring black hole masses. The method works because gas orbits faster around massive black holes than it does around smaller ones.

Peterson reported the early results Saturday at the meeting of the American Association for the Advancement of Science in Washington, DC.

Two of the team members -- Luis Ho of the Observatories of the Carnegie Institution of Washington, and Alex Fillippenko of the University of California, Berkeley -- were the first to suspect that the black hole mass was very small. Filippenko and Wallace L.W. Sargent of the California Institute of Technology first discovered the black hole in 1989.

This is the first time astronomers have been able to measure the mass of the black hole in NGC 4395, and confirm that it is indeed smaller than others of its kind.

Peterson and Laor emphasized that the results are very preliminary, but the black hole seems to be at least a hundred times smaller than any other black hole ever detected inside an AGN.

The astronomers want to refine that estimate before they address the next most logical question: why is the black hole so small?

"Is it the runt of the litter, or did it just happen to form under special circumstances? We don't know yet," Peterson said.
NGC 4395 doesn't appear to have a dense spherical nucleus, called a galactic bulge, at its center; it could be that the black hole "ate" all the stars in the bulge, and doesn't have any more food within reach. That would keep the black hole from growing.
Team members are most interested in what the black hole measurement can tell astronomers about AGNs in general. Any new information could help astronomers better understand the role that black holes play in making galaxies like our own form and evolve. To that end, the team is also studying related data from NASA's Chandra X-ray Observatory and ground-based telescopes.
"It's these extreme types of objects that really allow you to test your theories," Peterson said.

Hubble weighs in on the heaviest stars in the galaxy

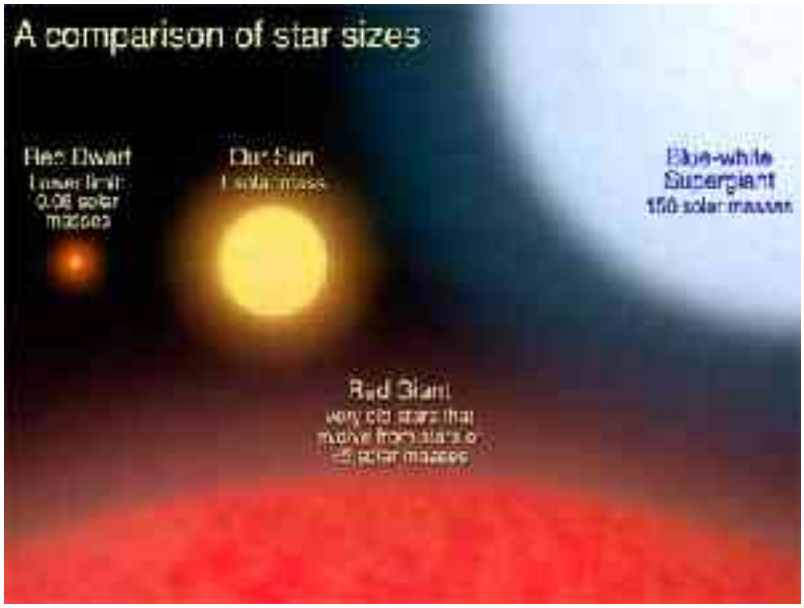
NASA NEWS RELEASE
Posted: March 9, 2005

Astronomers have taken an important step toward establishing an upper limit to the masses of stars. Using NASA's Hubble Space Telescope, they made the first direct measurement within our Milky Way Galaxy, and concluded stars cannot get any larger than about 150 times the mass of our sun.

This artist's impression shows how the Arches star cluster appears from deep inside the hub of our Milky Way Galaxy. Although hidden from our direct view, the massive cluster lies 25,000 light-years away and is the densest known gathering of young stars in our galaxy. The illustration is based on infrared observations with Hubble and with ground-based telescopes, which pierced our galaxy's dusty core and snapped images of the luminous cluster of about 2,000 stars. Credit: NASA, ESA and A. Schaller (for STScI)

The astronomers used the Hubble to probe the Arches cluster, the densest in our galaxy. The finding takes astronomers closer to understanding the complex star formation process. It also gives the strongest backing yet to the notion stars have a weight limit.
"This is an incredible cluster that contains a rich collection of some of the most massive stars in the galaxy, yet it appears to be missing stars more massive than 150 times the mass of our sun," said astronomer Donald Figer of the Space Telescope Science Institute, Baltimore. "Theories predict the more massive the cluster, the more massive the stars within it. We looked at one of the most massive clusters in our galaxy and found there is a sharp cutoff to how large a star can form," he added.
A star's weight ranges from less than one-tenth to more than 100 times the mass of our sun. Although astronomers know stars come in a variety of masses, they don't know if the bodies have a weight limit at birth. Knowing how large a star can form may offer important clues to how the universe makes them.

Astronomers have been uncertain about how large a star can get before it cannot hold itself together and blows apart. Astronomers don't know enough about the details of the star-formation process to estimate a star's upper mass. Consequently, theories have predicted stars can be anywhere between 100 to 1,000 times more massive than the sun.



This illustration compares the different masses of stars. Credit: NASA, ESA and A. Feild (STScI)

Figer's finding is consistent with statistical studies of smaller-mass star clusters in our galaxy and with observations of a massive star cluster known as R136 in our galactic neighbour, the Large Magellanic Cloud.

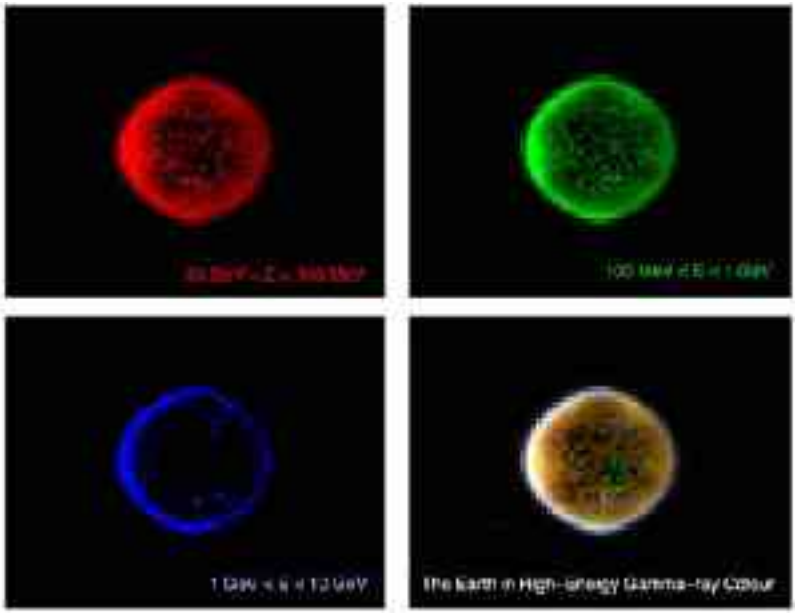
Figer used Hubble's Near Infrared Camera and Multi-Object Spectrometer to study hundreds of stars ranging from six to 130 solar masses. Although Figer did not find any stars larger than 130 solar masses, he conservatively set the upper limit at 150 solar masses. The Arches cluster is a youngster about 2 to 2.5 million years old. It resides 25,000 light-years away from Earth in our galaxy's hub, a hotbed of massive star formation. In this region huge clouds of gas collide to form behemoth stars. Hubble's infrared camera is well suited to analyze the cluster, because it penetrates the dusty core of our galaxy. It produces sharp images, allowing the telescope to see individual stars in a tightly packed cluster.

Figer estimated the stars' masses by measuring the ages of the cluster and the brightness of the individual stars. He also collaborated with Francisco Najarro of the Instituto de Estructura de la Materia in Madrid, Spain. Najarro produced detailed models to confirm the masses, chemical abundances and ages of the Arches cluster stars. "Standard theories predict 20 to 30 stars with masses between 130 and 1,000 solar masses," Figer explained. "But we found none. If they had formed, we would have seen them," he added.

Figer cautions the upper limit does not rule out the existence of stars larger than 150 solar masses. His next step is to pinpoint more clusters to test his weight limit. Several telescopes, including NASA's Spitzer Space Telescope, have been searching for new star clusters in the Milky Way.

New image of Earth, seen through gamma-ray eyes

NASA-GSFC NEWS RELEASE
Posted: March 30, 2005



Here we see a false-colour image of the Earth in three gamma-ray energy bands, analogous to the colours red (lower energy), green (mid energy) and blue (higher energy) in the visible spectrum. For the complete caption and print-resolution versions, see the links at the end of this article. Credit: NASA/CGRO/EGRET/ Dirk Petry

The image portrays how the Earth is constantly bombarded by particles from space. These particles, called cosmic rays, hit our atmosphere and produce the gamma-ray light high above the Earth. The atmosphere blocks harmful cosmic rays and other high-energy radiation from reaching us on the Earth's surface.

"If our eyes could see high-energy gamma rays, this is what the Earth would look like from space," said Dr. Dirk Petry of NASA Goddard Space Flight Center in Greenbelt, Md. "Other planets -- most famously, Jupiter -- have a gamma-ray glow, but they are too far away from us to image in any detail."

Petry assembled this image from seven years of data from NASA's Compton Gamma-Ray Observatory, which was active from 1991 to 2000. The Compton Observatory orbited the Earth at an average altitude of about 260 miles (420 km). From this distance, the Earth appears as a huge disk with an angular diameter of 140 degrees. The long exposure and close distance enabled Petry to produce a gamma-ray image of surprisingly high detail. "This is essentially a seven-year exposure," Petry said.

The gamma rays produced in the Earth's atmosphere were detected by Compton's EGRET instrument, short for Energetic Gamma-Ray Experiment Telescope. In fact, 60 percent of the gamma rays detected by EGRET were from Earth and not deep space. Although it makes a pretty image, local gamma-ray production interferes with observations of distant gamma-ray sources, such as black holes, pulsars, and supernova remnants.

Petry created this gamma-ray Earth image to better understand the impact of "local" cosmic-ray and gamma-ray interactions on an upcoming NASA mission called GLAST, the Gamma-ray Large Area Space Telescope. GLAST is planned for launch in 2007. Its main instrument, the Large Area Telescope, is essentially EGRET's successor.

In 1972 and 1973 the NASA satellite SAS-II captured the first resolved image of the Earth in gamma rays, but the detectors had less exposure time (a few months) and worse energy resolution

Petry, a member of the GLAST team at NASA Goddard, is an assistant research professor at the Joint Center for Astrophysics of the University of Maryland, Baltimore Country.

Moon

New	8th	1st Qtr	16th	Full	24th	Last Qtr	2nd

Events:

8th Mars 38' south of θ Capricorni
12th Virginids meteor shower, peak of 5 per hour
14th Mars 2.5' south of λ Capricorni
22nd Jupiter 1° north of Moon
22nd Lyrids meteor shower, peak of 20 per hour (unfavourable Moon)

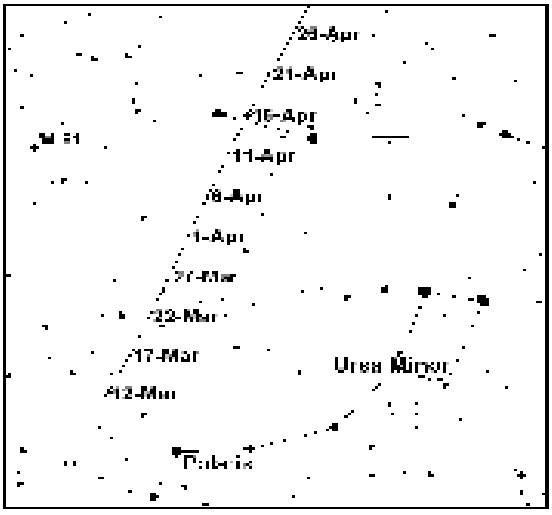
Planets:

Mars	Rises about 03.30 hrs, low in morning sky at Mag +0.8 in Capricornus
Jupiter	At opposition on 4th , apparent diameter 44.2", Mag –2.5
Saturn	Still well placed in Gemini for evening and early morning viewing, at Mag +0.1

Close Encounters	
6th	Mars 5.5° north of Moon at 02.00 hrs.
11th	20hr old Moon just 3.5° south of Mercury
19th	Saturn 4.5° south of Moon
20th	Mars 45' north of M75 (open cluster) in Capricornus
26th	Jupiter 1.5° north of Moon

Comet

Comet 2004 Q2 (Machholz), is still visible through binoculars at Mag 8, heading through Draco towards Ursa Major (diagram courtesy of Lee Macdonald).



Constellations:

The following are well placed:
Auriga, Monoceros, Canis Major, Gemini, Cancer, Leo, Sextans, Hydra, Coma Berenices, Virgo, Bootes

Deep Sky Objects (some suggestions)

M36, M37, M38 (Aur), M35 (Gem), M44, M67 (Cnc), M46, M47 (Pup), M48, M68 (Hya), M50 (Mon), M65, M66, NGC3628, M95, M96, M105, NGC2903 (Leo), M81, M82 (Uma), NGC4361 (Cor), M53, M64, NGC4565, Mel 111 (Com), and of course all those messier galaxies in Virgo!

Sources:
FAS Astro Calendar 2004/2005, Astronomy Now (Apr), Sky &Telescope (Apr), Deep-Sky Observer's Year (Privett & Parsons)

John Axtell 1st April 2005