



TRANSIT

The Newsletter of



05 April 2007



A superb nautilus-shaped series of images taken by Keith Johnson during the 03 March 2007 Total Lunar Eclipse

Editorial

Last meeting : 09 March 2007. M-Brane Universes by Dr Ruth Gregory of Durham University.

Dr Gregory is world-renowned mathematician and cosmologist. She recently received the Institute of Physics Maxwell Medal, this places her in the elevated company of previous I.o.P. recipients – Niels Bohr, Stephen Hawking, Roger Penrose, Lord Rutherford, Max Plank and Fred Hoyle – many of whom went on to win a Nobel Prize. We all expect Dr Gregory to eventually receive her Nobel Prize.

Following an unfortunate failure of the digital projector Dr Gregory displayed her presentation skills in continuing her unaided talk on an exceedingly difficult and contentious subject with an easy to understand delivery.

Next meeting : 13 April – Darran Summerfield on “The Moon”

Our speakers for April and June have swapped places. Darran Summerfield will now speak on "The Moon" on 13 April, and Keith Johnson will speak on "Astrophotography" on 8 June.

Letters to the Editor :

*Any new observations, any comments on local or international astronomy, **anything** you want to share with your fellow members?*

Dear Editor,

Because of my interest in sundials I was fascinated by the previous Transit article “Why Earth is Closest to the Sun in Dead of Winter”. Apparently analemma have been traced onto stone paving by using a shadow stick to mark the position of the noon day sun throughout the year.

A settled life style and good weather would seem to be vital to complete one of these.

The greater size of the oceans in the southern hemisphere moderates temperature changes despite the influence of cold currents and winds coming from the land and ice of the Antarctic continent.

So the fact that the Earth is 3.3% closer to the Sun during the southern winter is negligible when compared to seasonable temperature changes.

One is reminded here that the smaller size of the southern continents does not affect the balance of the Earth, for when compared to the mass of the whole planet the difference is negligible.

Did eighteenth century scientists realize this and so when they said that a great southern continent was needed to provide balance was this an excuse to justify the voyage of the Endeavour along with its scientists who observed the transit of Venus?

In conclusion a reversed analemma is the one that would be traced out on a patio in the southern hemisphere.

from John Crowther

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The Total Lunar Eclipse from West Cornforth, 03 March 2007

from Jurgen Schmoll

Keith Johnson, a stargazer from nearby, visited me with his C 91/4 to use my 300D DSLR. Hence I used my modded 300D at Mrs Parsons (my 200/1000mm Skywatcher Newtonian). Furthermore I used a Pentax K1000 with slide film on the big refractor. And had loads of scopes floating around !

- ATM Newtonian "LAN" 257/1140 in observatory shed - visual
- Skywatcher Newtonian 200/1000 "Mrs Parsons" + mod. 300D
- Refractor "Mr Chevalier" 117/1750 with Pentax K1000 and Kodak Elitechrome 200
- Cassegrain "Carl" 150/2250 visual
- "The old Refraktor" Tasco 60/700 (>25 years old) visual
- "Luke Skywalker" - 20x90 binoculars on tripod

and the guest scopes:

- C 9 1/4 of Keith
- Skywatcher Newtonian I had in for alignment , 130/900
- "Lidlescope" of a neighbourhood boy, 70/700



Here an impression of the telescope forest:

[IMG]http://i41.photobucket.com/albums/e278/astrogeordie/astro/20070303/scopes_small.jpg/img]

I just finished erecting the most heavy ones when it clouded over. The moon, before visible as a dull disk, was gone. But there were 3 hours more to wait ...

One hour before the scopes got covered in charity bags as it looked even rainy !

1/2 hour before it started to clear up. And just in time it was really clear !!

Now I noticed Mrs Parsons was a bit bitchy - I could not find anything as the finder was 5 degrees off - needs the workshop. The tripod was too low, the location bad, the tracking went off sometimes ... relocation and lots of swearwords helped to sort her out. With coma corrector and Baader UV/IR blocker the modded 300 D was added and focused.

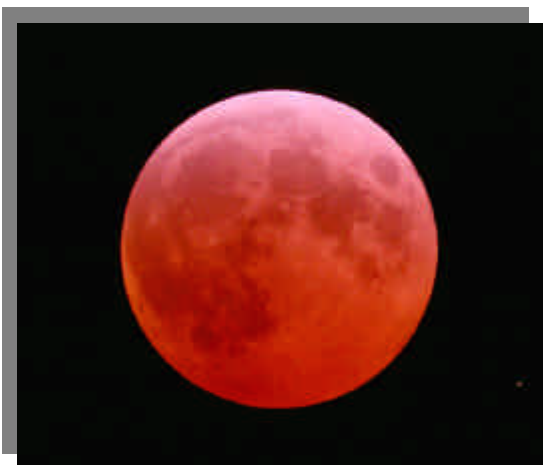
The Earth shadow started already to eat the moon. Visitors could watch it through a variety of scopes, and I introduced my DSLR to Keith - he worked with f/6.3 at his SCT (and I am sure he will post pictures as well!).



[IMG]http://i41.photobucket.com/albums/e278/astrogeordie/astro/20070303/entry_small.jpg[/img]

4 seconds, 100 ISO

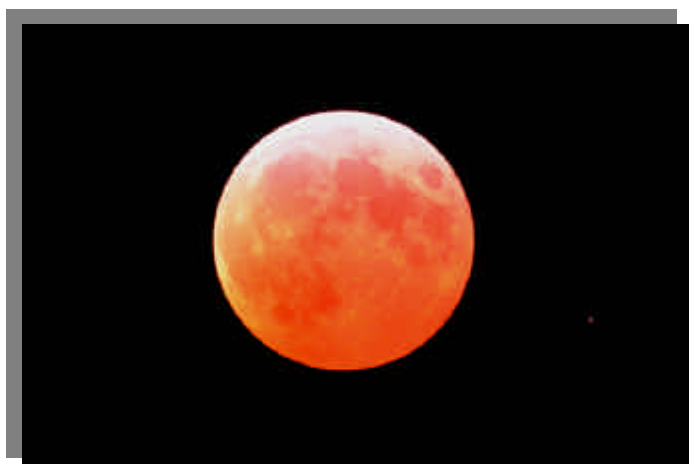
Now totality happened!



[IMG]http://i41.photobucket.com/albums/e278/astrogeordie/astro/20070303/total1_small.jpg[/img]

4 seconds, 100 ISO

In the partial phases the red of the moon was not striking, as the eye was blinded. But in totality it came out quite well.



[IMG]http://i41.photobucket.com/albums/e278/astrogeordie/astro/20070303/total2_small.jpg[/img]

4 seconds, 100 ISO

A special joy was visual observation through the 20x90s, as the moon gave a real 3D impression and lots of stars have been visible in the background!

Here an over-exposure to show the lots of background stars

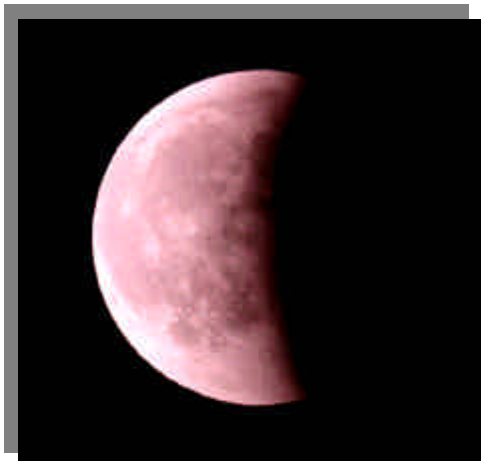


[IMG]http://i41.photobucket.com/albums/e278/astrogeordie/astro/20070303/background_small.jpg[/img]

30 sec, 800 ISO, *deliberately burning out the moon to show the stellar background*

I got lots of pictures which demonstrate how the moon moves through the star field associated with the Earth shadow that night. Also, Keith got some nice M51 images as it was so nice dark. I think he got DSLR-addicted that night.

Everything has an end (only the sausage has two of them), so here two pics of the moon coming out of the shadow:



[IMG]http://i41.photobucket.com/albums/e278/astrogeordie/astro/20070303/exit2_small.jpg[/img]

1/30s, 100 ISO



[IMG]http://i41.photobucket.com/albums/e278/astrogeordie/astro/20070303/exit1_small.jpg[img]

1/30s, 100 ISO

Just at 5 it started to cloud over, and Sunday was a hell of rain. Lucky

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Stephen Hawking to Take Zero Gravity Flight

By The Associated Press



left : Stephen Hawking

CAPE CANAVERAL, Fla. (AP) -- Renowned theoretical physicist Stephen Hawking, who authored the best-selling book, "A Brief History of Time," soon will experience a brief history with weightlessness.

Hawking, who uses a wheelchair and is almost completely paralyzed by amyotrophic lateral sclerosis, or Lou Gehrig's disease, plans to go on a weightless flight on April 26, officials at the flight operator said Thursday.

The flight, operated by Zero Gravity Corporation, a Fort Lauderdale, Fla.-based space tourism and entertainment company, will take off and return to a landing strip at the Kennedy Space Center.

"As someone who has studied gravity and black holes all of my life, I am excited to experience first hand weightlessness and a zero-gravity environment," Hawking said in a statement.

The modified Boeing 727 generally soars to 32,000 feet at a sharp angle and then plunges 8,000 feet so passengers can experience 25-second snippets of zero gravity during the descent. As the plane climbs, passengers experience 25 seconds of being pushed down hard, as they feel 1.8 times the normal pull of the Earth.

Zero Gravity CEO Peter Diamandis said assistants will be onboard to help Hawking.

"The key thing here is that weightless and personal spaceflight is something available to everyone, even someone like Prof. Hawking," Diamandis told *The Associated Press*. "This something that almost everyone can now experience."

Zero Gravity will pick up the bill, which normally is \$3,750. The company also plans to have two seats on the flight auctioned off by two charities.

The company began offering the flights in 2004.

Last year, Hawking publicly spoke of his desire to go into space and made an appeal to Sir Richard Branson, whose company, Virgin Galactic, is building a suborbital spaceship that could be flying passengers as early as 2009.

Branson has decided he will personally finance Hawking's ticket into space -- a flight that would normally cost \$200,000.

"He's one of the greatest physicists of all time," Virgin Galactic president Will Whitehorn told AP earlier this year.

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Wake! For the Sun who scattered into flight
The stars before him from the field of night
Drives night along with them from Heaven and strikes
The Sultan's turret with a Shaft of Light

Omar Khayyam

“Early Calendars”

from Pat Duggan

The night sky played a large part in people’s lives before the days of TV. With all the scattered power-cuts, that have made the world news lately, I got to thinking how people would have expressed their “year” when civilizations were based only on “the need to feed”. Without the NHS I suppose 50% of the population would have suffered from myopia and not seen anything more than the Moon and Sirius at night, we tend to forget this. Those with good eyesight would have had the stimulus to work out a calendar and become the “leaders” - able to accurately tell Spring from Autumn – and thus assure that crops were planted and harvested at the most suitable time of year. The written, tablet type, calendars were only to be read by the few, (in the same way, I suspect, that a small child is not given a Ming vase to play with). There are records to show breaking such a “taboo” had serious consequences!

Pat

“Early Calendars”

A great deal has been written about “Our Moon” over the years, but in ancient Rongorongo inscriptions quite what was described remains a mystery to this day. Here is a sample of pictographs recognised and acknowledged as being about an early calendar from Easter Island (Fig. 1). As you would expect, the phases of the Moon are prominent, with the notable stars also symbolised. A lunar month is 29.52 and extra length of phase was apparently inserted where needed. Study of moon phases must have posed the problem of dividing the year, for agricultural purposes, into regular sections. The more accurate parallel of watching the angle of the Sun’s progression across the sky would have been studied and may account for the worldwide presence of ancient stone henge ruins. Annual records coupled with good eyesight must have eventually proven the night sky to be the most predictable calendar. It is not surprising to find that Sirius was important because it is so bright. The regular appearance of a star or constellation was symbolised with its own pictograph.

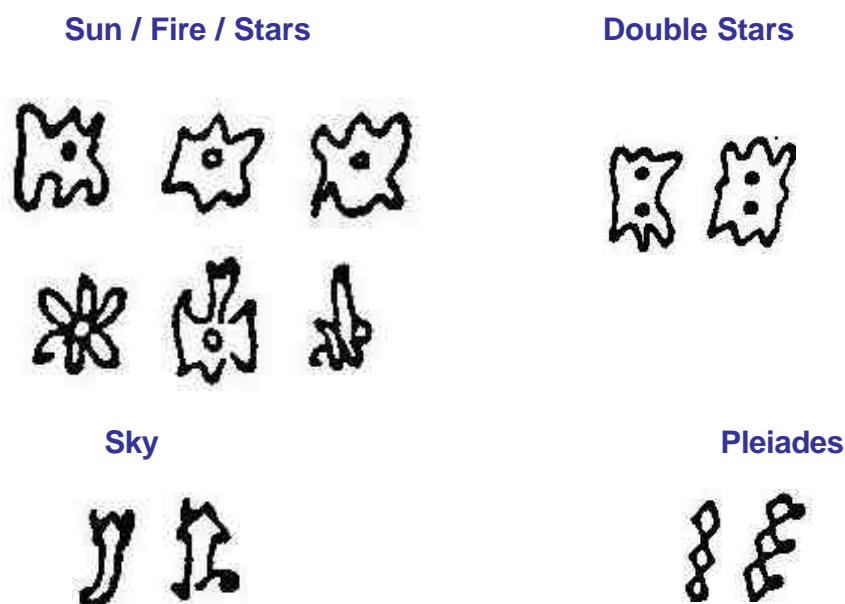
It may not have been easy to insist the farmers start their planting on time. Politics might have entered the system next - with Zodiac stories and myths to encourage human events on Earth to be seen as related to the Heavens.

Fig. 1. A section of the Mamari tablet inscription, said to be a lunar calendar.

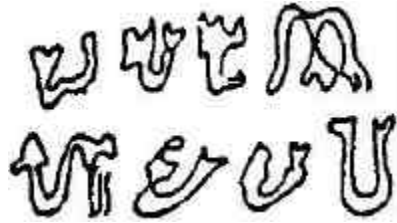


Rapanui language has replaced the ancient Rongorongo. The sign meanings in Fig. 2 were recorded by Bishop Jaussen about 1883 and relate to the sky. He was bishop of Tahiti and worked with missionaries from several Pacific islands, including Easter Island. He located an old Rapanui speaking man called Metoro Tau'r Ure, who was able to chant the content of the tablets and explain the turning motion used to read the lines. The translation was difficult as Bishop Jaussen only spoke French and Tahitian and much was considered to be guesswork purely from the appearance of similar ancient inscriptions.

Fig. 2. Signs in Rapanui script guessed to refer to the night sky.



Some of the many symbols representing the Milky Way, which is very clearly seen above the vast Pacific Ocean.



Various attempts have been made to explain the Mamari tablet, most agreeing that a Lunar Calendar of sorts is described. However, there is still a line of thought that considers the possibility it is only a lonely “Fisherman’s Yarn,” or perhaps the first attempt at Oceanian Sci Fi. It could also have been contrived as a hoax by these imaginative and isolated islanders, to perplex inquisitive foreign explorers and visiting missionaries.

It is sad that predominantly linguists and not astronomers have performed the more comprehensive reviews of these old languages. So much more of the texts might make sense today because historical star maps can be accurately computed for comparison.

. *Biblio: Lost Languages by Andrew Robinson*

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[NASA cutbacks will delay Moon Missions](#)

The New York Times is reporting that recent cutbacks to NASA’s budgets will probably push back the human return to the Moon. Instead of retiring the Space Shuttle and sending the first spacecraft back to the Moon in 2014, the first missions won’t be until 2015 instead, according to NASA administrator Michael Griffin.

Griffin announced the delays during a recent US Senate hearing. He said that the budget cuts will require the agency to redirect its efforts away from the new Orion crew vehicle and the Ares I launch vehicle.

Although the Bush administration had proposed \$17.5 billion for NASA funding, providing adequate resources to keep the project on schedule, congress froze

any funding increases, keeping it at the previous year's levels. This will have the effect of reducing the Orion/Ares development budget by \$577 million.

Once the shuttle is retired in 2010, there will be 4-5 years where the US won't be sending any humans into space. Griffin sees this as a shame, since other groups - China, Russia, and ESA - will be capable of launching manned missions.

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"At my age I do what Mark Twain did. I get my daily paper, look at the obituaries page and if I'm not there I carry on as usual."

Patrick Moore.

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I thought "The Martians have arrived!", but then I realised that I was looking at pollen slightly out of focus.

Patrick Moore on looking through his telescope - quoted in the Observer, March 2003

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Neptune May Have Thousands of Escorts

by David Powell

Neptune may be escorted in its orbit by thousands of asteroid-like objects, perhaps more than exist in the entire asteroid belt. So far, five of these enigmatic bodies, known as Trojans, have been found at one of Neptune's Lagrange points. These are places where the gravity of a planet and that of the Sun interact to create an area of gravitational stability.

Jupiter's Lagrange regions are home to legions of Trojans, and around 2,000 cluster at these gravity graves along Jupiter's orbit 60 degrees ahead and 60 degrees behind the gas giant.

The first Neptune Trojan was discovered in 2001 as part of the NASA funded Deep Ecliptic Survey at the Lagrange region 60 degrees and 3.1 billion miles (5

billion kilometers) ahead of Neptune. A further three Neptune Trojans between 37 and 87 miles (60 and 140 kilometers) in diameter and shaded a pale red color have since been identified by Scott Sheppard of the Carnegie Institution of Washington and Chadwick Trujillo of the Gemini Observatory in Hawaii using the 6.5-meter Magellan telescope in Chile.

Despite their diminutive size and brightness, the Neptune Trojans quickly betrayed their existence by their distinct motion against background stars. The most recent Trojan discovered by Sheppard and Trujillo is moving at an unusual inclination of 25 degrees relative to the plane of the solar system (the ecliptic).

"The sky we covered searching for Neptune Trojans was all within 1.5 degrees of the ecliptic," Sheppard said. "High inclination objects will spend the majority of their time off the ecliptic. Thus detecting a high inclination Trojan in our survey suggests there is a large population of such objects. In fact, the high inclination objects appear to outnumber the low inclination objects by a ratio of four to one." If so, there would be swarms of Trojans accompanying Neptune, perhaps up to twenty times more than at Jupiter. The sheer number of Trojans Neptune is thought to harbor reveal that these objects are an established part of Neptune's entourage, dating back to shortly after the planet's formation.

"Neptune cannot currently efficiently capture Trojans for long periods of time," Sheppard said. "Just after the planet formation epoch Neptune's orbit was likely much more eccentric due to its interactions with the other planets. Neptune's interactions with the myriad small bodies around its orbit which included comets, Kuiper Belt objects and other debris which formed nearby would have slowly circularized Neptune's orbit."

This process would have trapped many diverse objects at the Neptune Lagrange points irrespective of their inclination. This diversity is exciting as in 2014 we may get the opportunity to see a Trojan up close courtesy of the New Horizons spacecraft currently en-route to Pluto.

"If a Neptune Trojan could be found which the New Horizons spacecraft could image it would be one of the highlights of the mission," Sheppard said. "The Neptune Trojans are very faint and thus hard to observe from our location on Earth. Thus little is known about their surface properties or composition. The Neptune Trojans may be a unique type of solar system object of which no other stable reservoir currently exists."

At present this flyby of a Neptune Trojan is far from a certainty due to the fact that New Horizons will pass 60 degrees behind Neptune through the trailing Lagrange region known as "L5" where no Trojans have yet been identified.

"We are attempting to discover possible Neptune L5 Trojans, but because of the high background star confusion it will be a tough task for the next several years," Sheppard said. "The constraints on the New Horizons spacecraft are also severe

since it will not be able to maneuver too far from its current trajectory. Thus, there is only a very low probability that a Neptune Trojan happens to be in a favorable location for the spacecraft to encounter."

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Reflections on a Mote of Dust

Carl Sagan (1934-1996)



left : Image of distant Earth (white dot)
from Voyager 1, 1990.

We succeeded in taking that picture [from deep space], and, if you look at it, you see a dot. That's here. That's home. That's us. On it, everyone you ever heard of, every human being who ever lived, lived out their lives. The aggregate of all our joys and sufferings, thousands of confident religions, ideologies and economic doctrines, every hunter and forager, every hero and coward, every creator and destroyer of civilizations, every king and peasant, every young couple in love, every hopeful child, every mother and father, every inventor and explorer, every teacher of morals, every corrupt politician, every superstar, every supreme leader, every saint and sinner in the history of our species, lived there on a mote of dust, suspended in a sunbeam.

The earth is a very small stage in a vast cosmic arena. Think of the rivers of blood spilled by all those generals and emperors so that in glory and in triumph they could become the momentary masters of a fraction of a dot. Think of the endless cruelties visited by the inhabitants of one corner of the dot on scarcely distinguishable inhabitants of some other corner of the dot. How frequent their misunderstandings, how eager they are to kill one another, how fervent their

hatreds. Our posturings, our imagined self-importance, the delusion that we have some privileged position in the universe, are challenged by this point of pale light.

Our planet is a lonely speck in the great enveloping cosmic dark. In our obscurity -- in all this vastness -- there is no hint that help will come from elsewhere to save us from ourselves. It is up to us. It's been said that astronomy is a humbling, and I might add, a character-building experience. To my mind, there is perhaps no better demonstration of the folly of human conceits than this distant image of our tiny world. To me, it underscores our responsibility to deal more kindly and compassionately with one another and to preserve and cherish that pale blue dot, the only home we've ever known.

Excerpted from a commencement address delivered May 11, 1996. Dr. Sagan's book Pale Blue Dot expands on these ideas.

Carl Sagan didn't live to see this image of Earth as seen from Mars taken by Mars Global Surveyor in 2003. But he would have loved it.

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I am often amazed at how much more capability and enthusiasm for science there is among elementary school youngsters than among college students.

Carl Sagan

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Planck Satellite prepares to go super-cold

by Paul Rincon, Science reporter, BBC News

George Smoot wants to know the answers to some big questions.

"I want to know how the Universe came into being, how it developed and what its future might be," he says. The US Nobel Laureate has spent a large part of his career investigating the Cosmic Microwave Background (CMB) - the "first light" released after the Big Bang.

Scientists like Professor Smoot study this remnant radiation from the birth of the Universe in the hope of answering some of these questions. That dim afterglow, which fills the entire sky today, carries a wealth of information about the cosmos

in its infancy. "When we look back to the past, we can see everything between the past and now, and that allows us to project to the future," Professor Smoot says.

The researcher, from the Lawrence Berkeley National Laboratory (LBNL) in California, shared last year's Nobel Prize in Physics with collaborator John Mather for work on the Cosmic Background Explorer (Cobe) mission. The Cobe satellite detected subtle temperature variations in the CMB which pointed to the ripples in density that gave rise to the first stars and galaxies.

Superior precision

Another US spacecraft, the Wilkinson Microwave Anisotropy Probe (WMap), was launched in 2001. It has helped constrain estimates for the age of the Universe, shed important light on its composition and has shown that its shape is very close to flat. In the middle of 2008, the third satellite to investigate the CMB will blast off on a mission to address similar issues - but from a fresh perspective. The European Space Agency's (ESA) Planck satellite, named after the great German physicist Max Planck, will map the background sea of microwaves with unparalleled precision.

Professor Smoot was talking at a news conference to mark the approaching end of Planck's physical "integration" as a satellite at the aerospace firm Alcatel Alenia Space's facility in Cannes, France. "We are proposing that this mission creates a recipe that will allow us to better understand the Universe," said Jan Tauber, Planck's project scientist. Professor Smoot added: "With Planck, we are exploiting the relic radiation from the Big Bang. That's difficult to do unless you have contrast."

Accepted theory

Contrast is a key strength of Planck. It will look at nine wavelength bands in the electromagnetic spectrum - the range of all possible radiation from gamma rays through to visible light and radio waves. The CMB has a well defined "signature" in this spectrum. "We can use the nine bands to distinguish the CMB from the other foreground signals in the sky," said the LBNL scientist. Planck's superior sensitivity, angular resolution and frequency range should open up some hazy areas in our understanding of the cosmos.

Few scientists today would question the broad details of the Big Bang model, in which the Universe was born in a hot, dense fireball that gradually expanded and cooled. But some fundamental details about the nature and evolution of the Universe are missing. For example, only 4% of the Universe is made up of ordinary matter that we can see. The rest is dark energy (73%) and dark matter (23%). Their influence can be detected indirectly, but scientists do not understand their nature. Planck could provide new information on dark energy, but it will depend on what this mysterious quantity is. This hypothetical form of

energy has negative pressure and permeates all of space. Scientists have proposed two main ideas for what dark energy might be.

Dynamic field

One is the so-called cosmological constant, originally put forward by Albert Einstein. This represents a constant energy density which fills space homogeneously. The second idea is that dark energy is a dynamic field, called quintessence, whose energy density varies in time and space. "If [dark energy] is the cosmological constant, then Planck doesn't provide that much extra information," Professor Smoot explained. "But if it's some kind of complicated dark energy, like quintessence, then it's quite possible that Planck will provide some key details."

Researchers want to confirm whether the very early cosmos underwent a short phase of exponential expansion, called inflation. "Inflation makes our model of the Universe fit in one piece, but it is still quite a mysterious thing," said Jan Tauber. "We want to understand whether it actually happened and, if so, what made it happen." In addition, scientists want to understand why we live at a time when the expansion of the Universe is accelerating again.

"We have this model in which the Universe flares out. Then it slows down again, allowing structures to form," said George Smoot. "Now, we have this flaring in which the age of structure formation is coming to an end and the expansion of the Universe is speeding up again."

Magic numbers

Cosmologists have built their models of the Universe on a dozen or so "magic numbers" that explain its large-scale properties. Planck will be able to measure these "cosmological parameters" to a very high degree of accuracy in order to select the model which best fits the Universe around us.

Planck consists of a telescope and science instruments placed on top of an octagonal service module. The baffle which surrounds them prevents light from the Sun and Moon interfering with detection of the microwave radiation.

In order to achieve its scientific objectives, Planck's detectors have to operate at very low and stable temperatures. The spacecraft is therefore equipped with a system to cool these detectors to temperatures close to absolute zero (-273.15C), the theoretical state of zero heat energy.

"It is an extremely elaborate cryogenic system," said Thomas Passvogel, Planck programme manager at Esa. "I think it's the first time a space mission has gone down to those low temperatures to provide detectors of that sensitivity in continuous operation."

The spacecraft is due to lift off on an Ariane 5 rocket from the Kourou spaceport in French Guiana on 31 July 2008. The Ariane rocket will carry Planck and

another mission, the Herschel infrared telescope, into space simultaneously. With a 3.5m mirror, Herschel will be the orbiting telescope with the largest mirror ever deployed in space. Together, Planck and Herschel will survey the cold Universe. But instead of looking for the formation of the Universe, Herschel's primary mission will be to see the formation of stars and galaxies.

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Asteroid 99942 “Apophis”

(99942) Apophis, previously known by its provisional designation 2004 MN₄, is a near-Earth asteroid that caused a brief period of concern in December 2004 because initial observations indicated a relatively large probability that it would strike the Earth in 2029. Additional observations improved predictions that eliminated the possibility of an impact on Earth or the Moon in 2029.

However, there remained a possibility that during the 2029 close encounter with Earth, Apophis would pass through a "gravitational keyhole", a precise region in space no more than about 400 meters across, that would set up a future impact on April 13, 2036. This possibility kept the asteroid at Level 1 on the Torino impact hazard scale until August 2006.

Additional observations of the trajectory of Apophis revealed the "keyhole" would likely be missed and on August 5, 2006, Apophis was lowered to a Level 0 on the Torino Scale. As of October 19, 2006 the impact probability for April 13, 2036 is estimated at 1 in 45,000. An additional impact date in 2037 has been identified, however the impact probability for that encounter is 1 in 12.3 million.

Despite the fact that there is no longer any significant probability of an Earth impact, the Planetary Society is offering a \$50,000 prize for the best plan to put a tracking device on or near the asteroid.

Apophis belongs to a group called the "Aten asteroids", asteroids with an orbital semi-major axis less than one astronomical unit. This particular one has an orbital period about the Sun of 323 days, and its path brings it across Earth's orbit twice on each passage around the Sun.

Based upon the observed brightness, Apophis's length was estimated at 415 m (1350 ft); a more refined estimate based on spectroscopic observations at NASA's Infrared Telescope Facility in Hawaii by Binzel, Rivkin, Bus, and Tokunaga (2005) is 320 m (1050 ft). Its mass is estimated to be 4.6×10^{10} kg.

It is now predicted that the asteroid will pass just below the altitude of geosynchronous satellites, which are at 35,786 km (22,300 mi). Apophis'

brightness will peak at magnitude 3.3, with a maximum angular speed of 42° per hour. Such a close approach by an asteroid of this size is expected to occur only every 1,300 years or so. The maximum apparent angular diameter will be ~2 arcseconds, which means it will be a starlike point of light in all but the very largest telescopes.

Apophis was discovered on June 19, 2004, by Roy A. Tucker, David J. Tholen, and Fabrizio Bernardi of the NASA-funded University of Hawaii Asteroid Survey from Kitt Peak National Observatory in Arizona. This group observed for two nights. The new object received the provisional designation 2004 MN₄.

On December 18, the object was rediscovered from Australia by Gordon Garradd of the Siding Spring Survey, another NASA-funded NEA survey. Further observations from around the globe over the next several days allowed the Minor Planet Center to confirm the connection to the June discovery.

Apophis is the Greek name of the Ancient Egyptian god Apep, "the Destroyer", who dwells in the eternal darkness of the Duat (underworld) and tries to destroy the Sun during its nightly passage.

Possible impact effects

Since the odds of impact are known to be very low, the possible effects of an impact are largely irrelevant. However, the initial reports resulted in widespread discussion on many Internet forums, including armchair speculation about exactly where Apophis (then known only as 2004 MN₄) would hit and what would happen when it did.

NASA initially estimated the energy that Apophis would have released if it impacted Earth as the equivalent of 1480 megatons of TNT. A more refined later NASA estimate was 880 megatons. The impacts which created the Barringer Crater or caused the Tunguska event are estimated to be in the 10-20 megaton range. The 1883 eruption of Krakatoa was the equivalent of roughly 200 megatons.

The exact effects of any impact would have varied based on the asteroid's composition, and the location and angle of impact. Any impact would have been extremely detrimental to an area of thousands of square kilometres, but would have been unlikely to have long-lasting global effects, such as the initiation of an impact winter.

- Earth's Greatest Hits :-

About 100 tons of interplanetary material drifts to the Earth's surface on a daily basis. Occasionally, an object hurtles with enough force to leave a mark.

ASTEROIDS are large rocky or metal bodies that originate in the relatively warm inner solar system, in the region between the orbits of Mars and Jupiter.

COMETS are composed mostly of water ice and rock, and form in the cold outer solar system beyond the planets' orbits. Scientists believe comets may have delivered the first organic compounds to Earth billions of years ago.

METEOROIDS are either pieces of asteroids that collided in space, or debris released by vaporizing comets. When meteoroids enter Earth's atmosphere, they are called meteors, and when they reach its surface they are called meteorites. So far, the remnants of more than 160 impact craters have been identified on Earth. Here are six of the most notable:

50 THOUSAND YEARS AGO :-

Barringer Crater

Arizona

Diameter: 4100 ft.

Cause: 150-ft.-wide meteorite

Claim to fame: Also called "Meteor Crater" (above), this is the first impact crater ever identified on Earth, as well as the best preserved one. In the 1960s, astronauts went there to practice sampling techniques for the Apollo program.

35 MILLION YEARS AGO :-

Chesapeake Bay Crater

Maryland

Diameter: 53 miles

Cause: 1- to 2-mile-wide meteorite

Claim to fame: Though long ago filled in by soil and water, this is the largest impact crater in the U.S. The event that caused it fractured bedrock more than a mile deep, creating a saltwater reservoir that still affects the region's groundwater.

35.7 MILLION YEARS AGO :-

Popigai Crater

Siberia, Russia

Diameter: 62 miles

Cause: 3-mile-wide asteroid

Claim to fame: The crater is flecked with industrial-grade diamonds created by shock pressure on graphite. A recent theory posits that this asteroid and the Chesapeake Bay meteorite originated from one asteroid.

65 MILLION YEARS AGO :-

Chicxulub Crater

Yucatán Peninsula, Mexico

Diameter: 110 miles

Cause: 6-mile-wide asteroid

Claim to fame: This impact triggered enormous tsunamis and magnitude 10 earthquakes. Scientists believe it led to the extinction of dinosaurs and of 75 percent of all species, effectively ending the Cretaceous Period.

1.85 BILLION YEARS AGO :-

Sudbury Crater

Ontario, Canada

Diameter: 155 miles

Cause: 6-mile-wide comet

Claim to fame: On the crater floor, heat from the impact and cometary water fed a system of hot springs possibly capable of supporting life. The rim of the crater also holds one of the world's largest supplies of nickel and copper ore.

2 BILLION YEARS AGO :-

Vredefort Dome

South Africa

Diameter: 236 miles

Cause: 6-mile-wide comet

Claim to fame: Though now the most eroded, Vredefort is the oldest and (at impact) the largest such crater on Earth. It was created by the world's greatest known energy release, which may have altered the evolution of single-cell organisms.

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Starry Starry Night

by Dennis di Cicco

Many casual skywatchers don't realize that simple binoculars can open the door to the exciting hobby of deep-sky observing. Double stars, bright and dark nebulae, distant galaxies, and star clusters are all visible with small binoculars. And among these deep-sky objects, open star clusters are some of the most rewarding to observe. Three are conveniently located high overhead as darkness falls during late March and early April.

Start by finding the roughly pentagon-shaped constellation Auriga, with brilliant, yellowish Capella at its northwest corner. Auriga appears near the center of the chart at about 8 p.m. Just off the pentagon's southeastern side you'll see a symbol labeled M37. This is the cluster Messier 37, which is the easiest of the three to spot (and it can even be glimpsed with the unaided eye under a clear,

dark sky). Observers with 7x35 binoculars have commented on its beauty. While you may see only a handful of individual stars, the group contains roughly 1,800 suns.

Before moving on to the next cluster, check the field of view of your binoculars, which is usually printed next to the right eyepiece and is given either as an angle or as the width of the field at a distance of 1,000 yards. Small binoculars typically have fields between 5° and 7° wide, which is between 260 and 370 feet at 1,000 yards. If your binoculars fall within this range, then the next star cluster, M36, will lie about half a field of view west-northwest of M37. M36 appears a little fainter and more compact than M37, since it only contains about 60 stars.

The last cluster, M38, lies another half binocular field to the west-northwest of M36. Its appearance is similar M37's, and there are about 160 stars within the group. These three clusters are roughly 4,000 light-years from us, so their light that you see tonight originated around the time the great pyramids were being built in Egypt.

If these clusters whet your appetite for more, just sweep your binocular view southward along the Milky Way toward Orion and Canis Major. Scores of opens clusters await your discovery.

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“We don’t understand how a single star forms, yet we want to understand how 10 billion stars form.”

Carlos Frenk, as quoted by Robert Irion, “Surveys Scour the Cosmic Deep,” *Science*, Vol. 303, 19 March 2004, p. 1750.

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[SMART-1 views the edge of Luna Incognita: Mars on the Moon?](#)



ESA Press release

SMART-1 has investigated lunar areas at the edge of Luna Incognita. This area near the lunar poles can be used for lunar science studies, or even to prepare for human bases on the Moon and on Mars.

Mankind did not see the land called Luna Incognita, until the first probes sent images of the lunar farside.

left : Plaskett and companion craters - AMIE mosaic

Plaskett crater sits close to the Moon's north pole, on the edge of Luna Incognita. Plaskett has a diameter of 109 kilometres and displays a central peak. This peak was formed during the crater's formation and is composed of rocks, originally from beneath the Moon's surface, which were melted and thrown up by the impact. As they rose above the surface they 'froze' and formed the peak. By analysing such central peaks, planetary scientists can deduce the vertical composition of the Moon's subsurface regions.

Plaskett crater could play a key role in preparing humans for their eventual journeys to Mars. On such a mission, Earth would dwindle to a point and the astronauts would lose the familiar view of their home planet. From the lunar near side the Earth is a brilliant object, four times wider than the full Moon seen from Earth. The Earth seems to wobble in the sky due to a lunar motion called libration. From the lunar poles libration takes the Earth below the horizon for about half the month.

From Plaskett, on the far side of the Moon, the Earth can only be seen from the crater's northern rim for just a few days during a few months every year.

"A human outpost there, on the edge of Luna Incognita, would allow us to study the effects of Earth-deprivation on a crew in a controlled way," says Bernard Foing, SMART-1's Project Scientist.

"It will allow us to simulate Mars operations and isolation, on the Moon, at a safe distance from a human base at the north pole."

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WYSI (not) WYG

from Phil Plait - the Bad Astronomer

For many things in life, what you see is what you get (on the 'net, that term is usually abbreviated WYSIWYG, and is pronounced "whizzy wig"). You'd think then that what you *don't* see you *don't* get, but in astronomy, sometimes what you don't see you can get anyway!

Long before the telescope was invented, humans still used a phenomenally complicated, intricate, and sensitive detector to observe the heavens: the eye. Our eye is amazingly sensitive to light, and has a huge range of light it can detect: the brightest astronomical object on the sky we can safely see is the full Moon, which is about 40 million times brighter than the faintest star you can see!

Yet with all that, the eye is a peculiar thing. The retina is the light sensitive tissue in the back of the eye. When light is detected, an impulse is sent to the optic

nerve, which then carries that signal to the brain. The problem is, the human eye has a concentration of color sensitive receptors (called cones) near the center of the eye, and these receptors are not very good in low light conditions. To see something dim, you have to move your eye a bit to get the image back on the more light-sensitive receptors (called rods).

The trouble with this less-sensitive spot becomes clear when you look at a faint object through a telescope. Since the spot is located almost dead center in the retina, when you look straight into a telescope, a faint object in the center of the field of view will disappear! It's a very odd and disorienting effect, but luckily you can cure it by just looking a little to the side. By doing that, the light from the object will fall on a sensitive part of the retina again, and you can see it. This technique is called "averted vision", and every experienced amateur astronomer knows how to use it. It takes getting used to, but once you get it you'll use it without even thinking about it.

Incidentally, sometimes objects are so faint that astronomers are not sure whether they are actually seeing it or not. In that case, we say they are using "averted imagination"

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The Wynyard Woodland Park Planetarium and Observatory are pleased to announce the performance of their 1,000th presentation on Tuesday 27th March 2007.

Our congratulations go to the two presenters, John McCue and Ed Restall and to all those forward-looking members of the Society who contributed to its construction.

Well done to all.