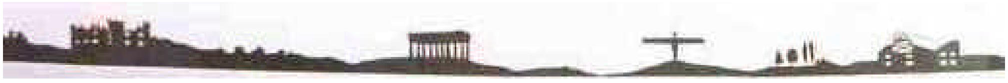


TRANSIT

The Newsletter of

Cleveland & Darlington Astronomical Society

05 August 2008

11/12 August 2008 – The Perseid Meteor Shower

Front Page Image – Hopefully a clear sky for the shower this year, keep an eye open for the Earthgrazers from 9:0pm onwards. Expect 50 – 100 meteors per hour at peak

Last meeting : 13 June 2008. Dr Jim Wild of Lancaster University will give a talk on “The Aurora Borealis” as part of the International Heliophysical Year (IHY) programme.

Next meeting : 12 September 2008. Presidential Address:
Title : “George Ellery Hale and the Palomar 200” Telescope”
by Jack Youdale FRAS, Honorary President of CaDAS

The 2008 Perseid Meteor Shower

The 2008 Perseid meteor shower peaks on August 12th and it should be a good show.

The time to look is during the dark hours before dawn on Tuesday, August 12th there should be plenty of meteors perhaps one or two every minute."

The source of the shower is Comet Swift-Tuttle. Although the comet is far away, currently located beyond the orbit of Uranus, a trail of debris from the comet stretches all the way back to Earth. Crossing the trail in August, Earth will be pelted by specks of comet dust hitting the atmosphere at 132,000 mph. At that speed, even a flimsy speck of dust makes a vivid streak of light when it disintegrates--a meteor! Because, Swift-Tuttle's meteors streak out of the constellation Perseus, they are called "Perseids."

Serious meteor hunters will begin their watch early, on Monday evening, August 11th, around 9 pm when Perseus first rises in the northeast. This is the time to look for Perseid Earthgrazers--meteors that approach from the horizon and skim the atmosphere overhead like a stone skipping across the surface of a pond.

"Earthgrazers are long, slow and colorful; they are among the most beautiful of meteors," says Cooke. He cautions that an hour of watching may net only a few of these at most, but seeing even one can make the whole night worthwhile.

A warm summer night. Bright meteors skipping overhead. And the peak is yet to come. What could be better?

The answer lies halfway up the southern sky: Jupiter and the gibbous Moon converge on August 11th and 12th for a close encounter in the constellation Sagittarius. It's a grand sight visible even from light-polluted cities.

For a while the beautiful Moon will interfere with the Perseids, lunar glare wiping out all but the brightest meteors. The situation reverses itself at 2 am on Tuesday morning, August 12th, when the Moon sets and leaves behind a dark sky for the Perseids. The shower will surge into the darkness, peppering the sky with dozens and perhaps hundreds of meteors until dawn.

The Wynyard Woodland Park Planetarium will be open from 7:00pm on the evening of Monday 11th August, all are welcome, refreshments available through till dawn if the sky remains clear.

Demonstrating the Solar System.

from Ray Worthy

As any teacher knows who has tried this, to give a class the correct idea of the scale of the Solar System and the relative sizes of the planets in one inclusive demonstration is practically impossible. If you choose a representation which shows the relative sizes of the planets, then you must show the smallest planet clearly with sufficient diameter, and if you do this, then you find that you cannot get the whole picture of the distances into the same demonstration.

This inclusive demo is certainly impossible in a book.

The school in which I was teaching in the sixties and seventies was one unit of four in a campus, in which each school shared facilities. The particular facility in which I was interested was the huge playing field. it was far and away the largest school field I have ever seen. I could see its possibilities in hosting the demonstration in question.

I calculated that if I began with a solar diameter of two hundred millimetres stuck on a wall in a particular position and taking a line which ran alongside part of the back fence, the field could accommodate all the planets up to and including Neptune but not Pluto. Pluto would have to be located over in the town shopping mall. At that time Quauar and the others had not been discovered, otherwise the end of the line would have been in the next county.

One has to bear in mind that , at all times the teacher has his or her class to consider. The class is ever present and will not go away whilst you are setting things up.

In the demo, each planet with its correct relative diameter, was affixed on to the top of a pole. Each planet's pole had to be planted upright into its calculated position.
The number of pupils in each class was about thirty to thirty five and every member ideally should be given something to do.

The more intellectual the class, the easier the presentation would be, but if this demo was included in the syllabus, then the classes which were intellectually challenged would have to be catered for.

From an educational standpoint, I decided that the advantages outweighed the disadvantages and went ahead with the idea. Remember, the aim was to give as many pupils as possible some part of the action , so I conceived the idea that some of the asteroids should be included in the scheme. How would you manage class control under these conditions?

At the beginning, the class would all would be positioned near the solar disc whilst I gave them the introductory talk. Then the different tasks would be allocated. This was the era before the advent of mobile telephones, so I had a system of bicycle riding messengers. There was a terrestrial telescope set up on a tripod near the school and those people who were not required at any particular time could use it as they wished. Everyone had to take notes as the demo progressed.

In fact, the whole idea was a great success and word got around the teaching faculties of the area. I became quite blasè about it.

Then came my come-uppance. One summer's day, when the conditions were perfect, the headmaster casually mentioned that we had a visitor and that he would like the visitor to see the famous demo. The Head did not, at that time tell me who the visitor was, but he turned out to be the County Advisor. He was a kind of chief school inspector and he said he had heard great things about my astronomy module.

The demo proceeded quite well and the allocations worked like clockwork.

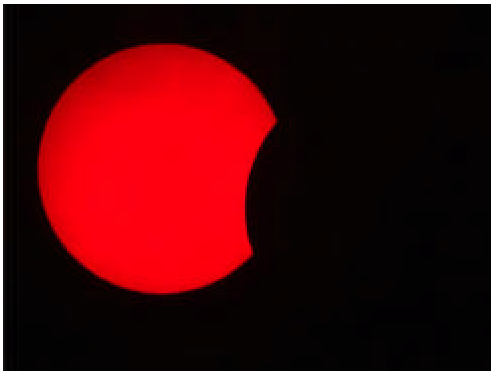
At the point where all the planets were spread out into their appropriate positions I noticed the inspector looking through the telescope. "Isn't there one missing?" He asked " How can that be?" I asked, and looked through the telescope.
Sure enough, one was missing there was a gap where one of the outer planets should have been. I called one of the messengers and sent him to discover where the planet had disappeared to.

After a while, the speeding cyclist returned and almost out of breath he reported,
" Please Sir, Uranus has gone over the fence for a smoke."

Partial Solar Eclipse Wynyard Woodland Park Planetarium – 01 August 2008

Three images from this morning taken by George and John Gargett with the camera held to the eyepiece of Jurgens Schmoll's 4" refractor with H-Alpha filter. The last image taken near maximum at 10:32am shows a hint of prominences at top and bottom. Ten CaDAS and DAS astronomers attended the event to guide the visiting public through the eclipse

Partial eclipse 010808 10.32am.jpg



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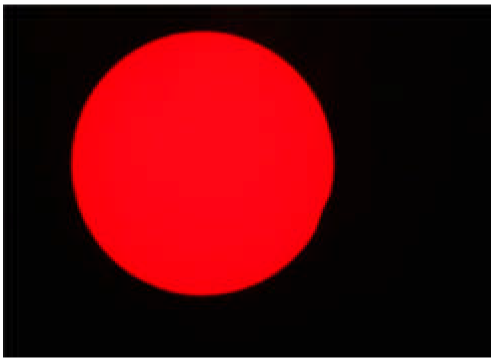


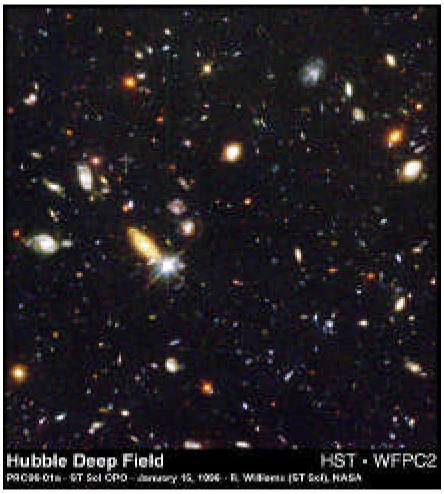
Partial eclipse 010808 11.20am.jpg

Between the Galaxies

From Michael Roe

What is between the galaxies? It's a good question. Also, how much is out there? If you look at photographs of galaxies there a few stars in the background, some of them are far out in the galactic halo, 3,000 Light years or more above the galaxy's disk plane.

At the galactic Pole there are about 1,700 stars in every square degree to magnitude +21. About 500 of these stars are magnitude +20 to +21.



The Hubble Space Telescope Deep Field survey reveals hundreds of galaxies but only about 5 stars, equivalent to just a few hundred faint stars for every square degree. So, right out into inter-galactic space stars are very sparsely scattered indeed.

Actually I have done some calculations. The space in between galaxies looks black, say it is less than 1% of the brightness of a face-on galaxy per area. A spiral galaxy is roughly 2000 Light years thick, its stars 5 Light years apart. Got that? Good!

Now say we have 5,000,000,000 Light years before relativistic effects do strange things to our view. That means the stars between galaxies are 2,500,000 times apart, times 100 in the line of sight. Doing the cube root means these stars are 3,000 Light years apart, probably more, very sparse, about 600 in a large galaxies volume. Most will be small faint red dwarf stars, old and small enough to escape a galaxy where they were formed.

More of these isolated stars exist in large galaxy clusters like the Virgo Cluster. Of course galaxy collisions can scatter stars, populating space.

There seems to be very few Globular Clusters here but some were detected in 2003. Being isolated, distant and tiny makes them difficult to find looking like slightly fuzzy stars under 10" across and fainter than magnitude +15 and only maybe a dozen or less brighter ones hidden in the whole sky, no doubt, mi-identified as distant elliptical galaxies.

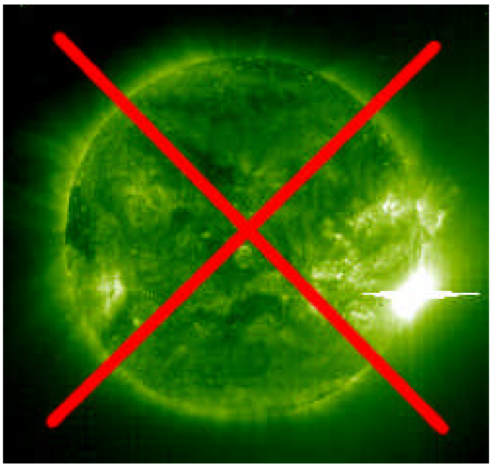
I expect there are brown dwarfs, escaped planets, asteroids and very sparse dust particles too, all wandering between the galaxies.

The most empty regions of the Universe are the Voids, huge bubbles of space bounded by filaments of galaxy clusters. The area behind the M31 Andromeda Galaxy could be such a Void, only very distant galaxies 500 million Light years away or so appear around this possible Void. These voids are so empty that atoms are several yards apart, dust particles even further apart and stars over 10,000 Light years from each other. Any world here would have a sky of total darkness unless it was in a planetary system.

A telescope would show a few faint galaxies, an asteroid belt and probably little else. Even wide-field telescopic long photographic exposures would show more galaxies, many quasars and a handful, maybe 5 faint stars brighter than magnitude +20, a black vast emptiness beyond our imagining - one of the strangest places in the Universe.

Why are there no green stars?

From The Bad Astronomer – Phil Plait



Go outside on a dark, moonless night. Look up. Is it December or January? Check out Betegeuse, glowing dully red at Orion's shoulder, and Rigel, a laser blue at his knee. A month later, yellow Capella rides high in Auriga.

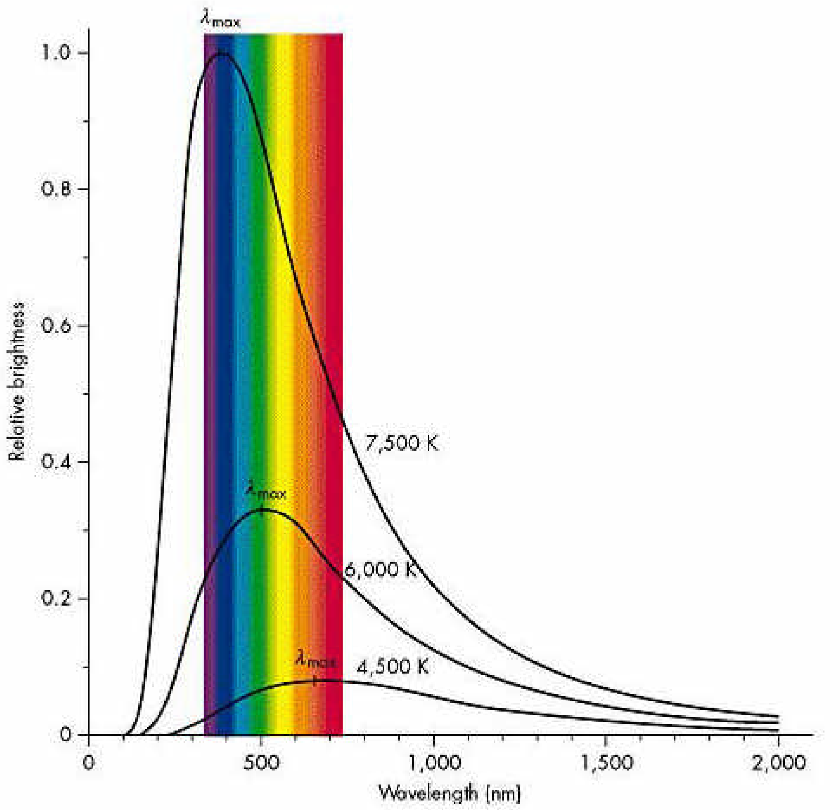
Is it August ? Find Vega, a sapphire in Lyra, or Antares, the orange-red heart of Scorpius. In fact, any time of the year you can find colors in the sky. Most stars look white, but the brightest ones show color. Red, orange, yellow, blue… almost all the colors of the rainbow. But hey, wait a sec.

Where are the green stars? Shouldn't we see them?
Nope. It's a very common question, but in fact we don't see any green stars at all. Here's why.

Take a blowtorch (figuratively!) and heat up an iron bar. After a moment it will glow red, then orange, then bluish-white. Then it'll melt. Why does it glow? Any matter above the temperature of absolute zero (about -273 Celsius) will emit light. The amount of light it gives off, and more importantly the *wavelength* of that light, depends on the temperature. The warmer the object, the shorter the wavelength.

Cold objects emit radio waves. Extremely hot objects emit ultraviolet light, or X-rays. At a very narrow of temperatures, hot objects will emit visible light (wavelengths from roughly 300 nanometers to about 700 nm).

Mind you — and this is critical in a minute — the objects don't emit a single wavelength of light. Instead, they emit photons in a range of wavelengths. If you were to use some sort of detector that is sensitive to the wavelengths of light emitted by an object, and then plotted the number of them versus wavelength, you get a lopsided plot called a blackbody curve. It's a bit like a bell curve, but it cuts off sharply at shorter wavelengths, and tails off at longer ones.
Here's an example of several curves, corresponding to various temperatures of objects (taken from online lecture notes at UW:



The x-axis is wavelength (color, if you like) color, and the spectrum of visible colors is superposed for reference. You can see the characteristic shape of the blackbody curve. As the object gets hotter, the peak shifts to the left, to shorter wavelengths.

An object that is at 4500 Kelvins (about 4200 Celsius or 7600 F) peaks in the orange part of the spectrum. Warm it up to 6000 Kelvin (about the temperature of the Sun, 5700 C or 10,000 F) and it peaks in the blue-green. Heat it up more, and the peaks moves into the blue, or even toward shorter wavelengths. In fact,

the hottest stars put out most of their light in the ultraviolet, at shorter wavelengths than we can see with our eyes.
Now wait a sec (again)… if the Sun peaks in the blue-green, why doesn't it *look* blue-green?

Ah, this is the key question! It's because it might *peak* in the blue-green, *but it still emits light at other colors.*

Look at the graph for an object as hot as the Sun. That curve peaks at blue-green, so it emits *most* of its photons there. But it still emits some that are bluer, and some that are redder. When we look at the Sun, we see all these colors blended together. Our eyes mix them up to produce one color: white. Yes, *white*. Some people say the Sun is yellow, but if it were really yellow to our eyes, then clouds would look yellow, and snow would too (all of it, not just some of it in your back yard where your dog hangs out).

OK, so the Sun doesn't look green. But can we fiddle with the temperature to get a green star? Maybe one that's slightly warmer or cooler than the Sun?
It turns out that no, you can't. A warmer star will put out more blue, and a cooler one more red, but no matter what, our eyes just won't see that as green.

The fault lies not in the stars (well, not entirely), but within ourselves.
Our eyes have light-sensitive cells in them called rods and cones. Rods are basically the brightness detectors, and are blind to color. Cones see color, and there are three kinds: ones sensitive to red, others to blue, and the third to green. When light hits them, each gets triggered by a different amount; red light (say, from a strawberry) really gets the red cones juiced, but the blue and green cones are rather blasé about it.

Most objects don't emit (or reflect) one color, so the cones are triggered by varying amounts. An orange, for example, gets the red cones going about twice as much as the green ones, but leaves the blue ones alone. When the brain receives the signal from the three cones, it says "This must be an object that is orange." If the green cones are seeing just as much light as the red, with the blue ones not seeing anything, we interpret that as yellow. And so on.
So the only way to see a star as being green is for it to be *only* emitting green light. But as you can see from the graph above, that's pretty much impossible.

Any star emitting mostly green will be putting out lots of red and blue as well, making the star look white. Changing the star's temperature will make it look orange, or yellow, or red, or blue, but you just can't get green. Our eyes simply won't see it that way.

That's why there are no green stars. The colors emitted by stars together with how our eyes see those colors pretty much guarantees it.

But that doesn't bug me. If you've ever put your eye to a telescope and seen gleaming Vega or ruddy Antares or the deeply orange Arcturus, you won't mind much either. Stars don't come in *all* colors, but they come in *enough* colors, and they're fantastically beautiful because of it.

New Solar System Guide: The Latest Lingo

By Tariq Malik

The solar system seems to be getting more crowded by the day as its once nine-world population gives way to a realm of planets, dwarfs and the dim and distant plutoids.

But in reality, the solar system is still the same. It's just the names for the new stuff astronomers find that are changing.

The cosmic can of worms opened in 2006 when after much debate the International Astronomical Union (IAU) - an international society of astronomers - demoted Pluto to dwarf planet status, 76 years after its discovery. The decision is still widely contended among astronomers, and the IAU added more fuel to the debate last month when it filed Pluto and similar objects under a new category: "plutoid."

Objects such as Eris and the newly-named Makemake, which like Pluto circle the sun out beyond the orbit of Neptune, also fall among the plutoid and dwarf planet ranks.

While astronomers continue to debate the definitions and differences of terms like "planet," "dwarf planet" and "plutoid," the IAU has offered its take on the newest rungs in the solar system's ladder:

What is a planet?

By the IAU's 2006 definition, a planet is a celestial body that orbits the sun, has enough mass that its gravity gives it a nearly round shape and has cleared its surrounding area of debris.

Pluto, while round and orbiting the sun, is one of a swarm of so-called trans-Neptunian objects, small icy bodies in the comet reservoir of the Kuiper Belt that extends out from Neptune's orbit, leading to its IAU demotion. But critics have said that asteroids can be found accompanying established planets like Earth, Mars and Jupiter, throwing a wrench in that requirement.

What is a dwarf planet?

A dwarf planet, meanwhile, is defined as an object that orbits the sun, has enough mass and gravity to assume a nearly round shape. It need not have swept its local region clean, which opened the dwarf planet gate not only for Pluto, Eris, Makemake and others beyond Neptune, but also Ceres - the largest asteroid in the solar system. Ceres circles the sun in the asteroid belt between Mars and Jupiter.

Objects smaller than a dwarf planet are called solar system bodies, according to the IAU. Other astronomers refer to such things, right down to relatively small asteroids, as minor planets.

What is a plutoid?

Last month, the IAU also reclassified Pluto, and any other dwarf planet or round object beyond Neptune, as a so-called plutoid.

Like dwarf planets, plutoids must orbit the sun and be massive enough to maintain a nearly round shape. But they also must be located beyond the orbit of Neptune, which circles the sun every 165 years from a distance of about 30 astronomical units (AU). One AU is the distance from the Earth to the sun, or about 93 million miles (150 million km).

It should be noted that according to the IAU, the small moons of dwarf planets or plutoids cannot themselves be considered as dwarf planets or plutoids.

What's in a name?

The three designations have taken center stage in recent years as astronomers spot new objects and refine the orbits and attributes of other known, but distant, solar system bodies. There are other, even odder designations – things like plutons, plutinos, centaurs and EKOs – but when it comes to actually naming something, the IAU wins out.

Take Makemake, which earned its name this summer three years after its discovery in 2005 by astronomer Mike Brown of the California Institute of Technology in Pasadena, Calif., whose team has discovered myriad similar, distant objects.

When astronomers spot a previously unknown solar system body or dwarf planet contender, it is given a preliminary designation by the IAU's Minor Planet Center (136472 for Makemake), and then observed until its orbit can be better determined. Once that happens, it gains a provisional moniker (Makemake was 2005 FY9) until an official name is chosen.

The discoverer of an object can then suggest a name to the IAU, which meets in a committee to decide on its suitability. For Makemake, Brown chose the name of a fertility god from Rapa Nui, or Easter Island.

"We take naming objects in the solar system very carefully," Brown wrote in a recent blog post, adding that he seeks names from mythology that seem to have some sort of resonance with the object to bear the moniker. "Each of these names came after considerable thought and debate, and each of them fit some characteristic of the body that made us feel that it was appropriate."

With that in mind, here's a look at what astronomer's know is way out there now, circling the sun:

The major planets

Since 2006, there have been just eight major planets, by the IAU's definition. Starting closest to the Sun, they are: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.

With the exception of Earth, the planets were named after major players in Greek or Roman mythology, a tradition that began in antiquity and was continued with the somewhat recent discoveries of Uranus (in 1781) and Neptune (in 1846).

The same approach was applied to Pluto when astronomer Clyde Tombaugh spotted it in 1930, though the demoted world's name was actually suggested by then 11-year-old Venetia Burney Phair of England. She named the world after the Roman god of the underworld.

Dwarf planets and plutoids

In addition to Pluto, the dwarf planet population of the solar system currently includes Ceres, Eris, Makemake and another world currently dubbed 2003 EL61.

- Named after a Roman goddess of grain, Ceres was discovered in 1801 and was initially considered a planet until astronomers began to spot other asteroids circling the sun in nearby orbits. While a dwarf planet, the round, potentially water-ice bearing space rock does not qualify as a plutoid because it circles the sun well inside the orbit of Neptune.
- Unlike Ceres, Eris (ee'-ris) does qualify as both dwarf planet and plutoid. It is about 70 miles (112 km) wider than Pluto, orbits the sun from about 9 billion miles (14 billion km) away and is one of the brightest objects in the Kuiper Belt.

  Discovered by Brown and his team in 2005, Eris was initially nicknamed "Xena" and its solitary moon "Gabrielle" after the lead characters of a television show. It takes its official name, Eris, from the Greek goddess of chaos and strife as a fitting tribute to the debate it and other object sparked over the definition of a planet. The object's moon, Dysnomia, is named after the daughter of Eris, who served as the spirit of lawlessness.
- Makemake (pronounced MAH-keh MAH-keh) is the newest dwarf planet and plutoid to gain a name. The tiny red-hued world is though to be covered with a layer of frozen methane and is smaller and dimmer than Pluto.

  Earlier this month, the IAU officially announced that the object was named

Makemake after the Polynesian god of fertility and creator of humanity among the people of Rapa Nui, also known as Easter Island, in the Pacific Ocean. Brown learned of the name while researching various mythologies for potential monikers and found it particularly striking. "Eris, Makemake, and 2003 EL61 were all discovered as my wife was 3-6 months pregnant with our daughter," he said in a statement.

Waiting in the wings

The list doesn't stop there. There are still more objects waiting for wings for either their own classification or official name:

- While it doesn't have an official name yet, 2003 EL61 is an object also discovered by Brown's team and an independent group led by Jose-Luis Ortiz of the Sierra Nevada Observatory in Spain. It has its own moon, is about 32 percent as massive as Pluto and about 70 percent that of Pluto's 1,413-mile (2,274-km) diameter. But it's also shaped like an ice-covered football, making it one weird, distant space cookie.

- Then there's Sedna (sed'nah), an object about three-fourths the size of Pluto that is so far out from the sun it takes about 10,500 years to make a single orbit. Sedna is about 1,100 miles (1,770 km) wide and circles the sun on an extremely eccentric orbit that ranges between 8 billion miles (12.9 billion km) and 84 billion miles (135 billion km). Brown's team led the discovery of that object in 2004 and named it after the Inuit goddess of the sea. Sedna does not qualify as a plutoid because of what some astronomers see as a quirky threshold for how much sunlight it reflects: Sedna is too dim.

- Quaoar (KWAH-o-ar), another find by Brown and co-discoverer Chad Trujillo, is 780 miles (1,250 km) wide, half the size of Pluto and takes 288 years to orbit the sun from about 4 billion miles (6.5 billion km) away. It was named after the creation force of the Tongva tribe of the Los Angeles basin.

- Brown's team also found Orcus (awr-kuhs), or 2004 DW, an object about 994 miles (1,600 km). It is nearly 47 AU from the Sun, was discovered in 2004, and is so Pluto-like in its attributes that astronomers named it after the Etruscan counterpart of the Roman underworld deity.

- And there's still Varuna, or KBO 20000 Varuna, an icy object 40 percent as large as Pluto and 560 miles (900 km) wide that was first spotted in 2000 by astronomers using the Spacewatch telescope in Arizona.

But don't get too comfortable with this list. There's surely more to follow.

By the IAU's own admission, at least a few dozen more dwarf planets, if not hundreds, remain to be found as they silently orbit the sun at the edge of the solar system.

Coronado PST - Personal H-Alpha Solar Telescope

written by Tammy Plotner

Are you interested in taking an in-depth look at our nearest star in a specific wavelength of light? H-alpha has a wavelength of 656.281 nanometers and is visible in the red part of the electromagnetic spectrum. A hydrogen-alpha filter is an optical filter designed to transmit a narrow bandwidth of light generally centred on the H-alpha wavelength.

These special filters are great, but they are difficult to use because of temperature and f-ratio requirements… not to mention expense! If you've ever been curious as to whether or not a Coronado PST was worth the price, then follow along.

At around £470, the Coronado Personal Solar Telescope isn't an investment you take lightly for such limited use. Because almost all telescopes and binoculars can be outfitted with a relatively inexpensive white light solar filter, it's almost an extravagance to view in this manner - or is it? For those who are able to afford specific Ha filters to fit their existing refractor telescopes, the luxury provides an incredible wealth of details unseen in white light - but also opens up a world of over-heating and sensitive adjustments. It's a scary thought to trust your permanent vision to a tiny piece of glass, but human curiosity is what it is. There are those of us who want and need more…

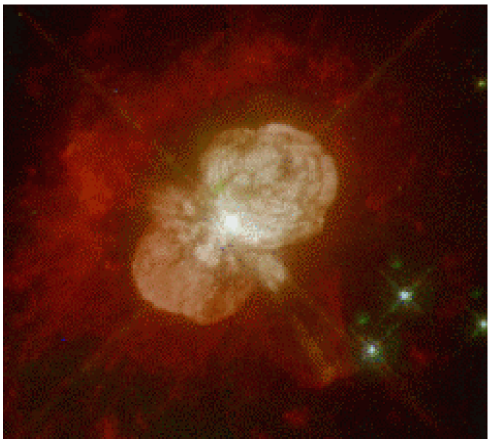
So enter the Coronado H-Alpha Personal Solar Telescope. For years I've wanted to get my hands on an h-alpha solar filter and the thought of having a dedicated solar telescope was simply too good to pass up. The refractor telescopes I own were meant for nighttime viewing and I knew this milled aluminum beauty was meant for only one thing - the Sun. But would this amazingly small little gold telescope give me everything that I had hoped for? All I needed was a sunny day…

Setting up a Coronado PST was everything it was promised to be. It is no more difficult to use than a spotting scope and the built-in "Sun Finder" is definitely a

bit easier than using the shadow-aim method. Happy as a little clam, I draped a black towel over my head and bent to the eyepiece. I kept sliding the focus up and down, but was met with nothing but a rotten, blurry image. Where's this great solar telescope, huh? Where's the excitement? I was disappointed at first.
But it wasn't the telescope's fault… It was mine.

Eta Carinae Vs. Peony: Which Star Will Go Supernova First?

written by Nancy Atkinson



The reigning champion for brightest star in the Milky Way is Eta Carinae, a highly unstable star prone to violent outbursts. Astronomers say Eta Carinae's life will probably end in 100,000 years or so with a supernova explosion. That's relatively soon in cosmic terms.

But the Spitzer Space Telescope has unearthed a contender, both in brightness and in the supernova competition, found in the dusty depths of our galaxy's center.

above : at 7,500 Ly Eta Carinae

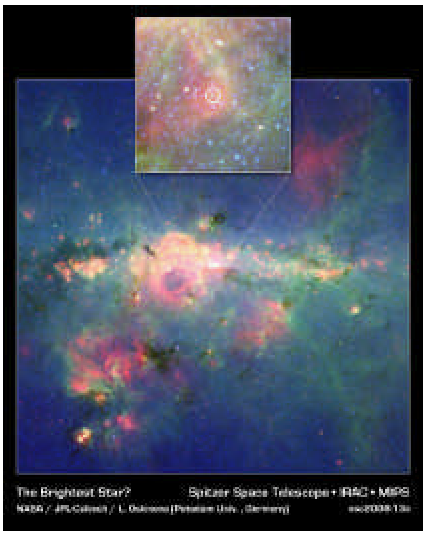
Astronomers say the Peony nebular star might be as bright as Eta. But the biggest question may be, which star will be the first to go supernova?
Eta Carinae has the luminosity of 4.7 million times the brightness of our sun. And the new challenger, Peony, burns with the brightness of an estimated 3.2 million suns. But astronomers say it's hard to pin down the exact brightness for these blazing stars, so they might shine with a similar amount of light.

Scientists already knew the Peony nebula star was out there, but they couldn't get a good look at it to estimate its luminosity because of its sheltered location in the dusty central hub of our galaxy. Spitzer's dust-piercing infrared eyes can penetrate the dust, and look into areas not visible with optical telescopes. Spitzer data was teamed up with infrared data from the European Southern Observatory's New Technology Telescope in Chile to calculate the Peony nebula star's luminosity.

"Infrared astronomy opens extraordinary views into the environment of the central region of our galaxy," said Lidia Oskinova of Potsdam University in Germany. "The Peony nebula star is a fascinating creature. It appears to be the second-brightest star that we now know of in the galaxy. There are probably other stars just as bright if not brighter in our galaxy that remain hidden from view."

Peony, with its rather delicate sounding name, is really a Big Bertha of a star. Astronomers estimate the Peony nebula star started its life with a hefty mass of roughly 150 to 200 times that of our sun.

It is a type of giant blue star called a Wolf-Rayet star, with a diameter roughly 100 times that of our sun. That means this star, if placed where our sun is, would extend out to about the orbit of Mercury.



Stars this massive are rare and puzzle astronomers because they push the limits required for stars to form. Theory predicts that if a star starts out too massive, it can't hold itself together and must break into a double or multiple stars instead.

Peony (maybe in an effort to control her weight) sheds an enormous amount of stellar matter in the form of strong winds. This matter is pushed so hard by strong radiation from the star that the winds speed up to about 1.6 million kilometers per hour (one million miles per hour) in only a few hours.

above : at 26,000 Ly Peony nebular star

Ultimately, the Peony nebula star will live a short life of a few million years and will blow up in the most fantastic of cosmic explosions called a supernova. In fact, Oskinova and her colleagues say that the star is ripe for exploding soon, which in astronomical terms mean anytime from now to millions of years from now.

When this star blows up, it will evaporate any planets orbiting stars in the vicinity," said Oskinova. "Farther out from the star, the explosion could actually trigger the birth of new stars."
In addition to the star itself, the astronomers noted a cloud of dust and gas, called a nebula, surrounding the star. The team nicknamed this cloud the Peony nebula because it resembles the ornate flower.

Eta and Peony. Deceptively petite and delicate names for such big stars about to go boom.

Let the competition begin!

News Source: JPL

Notes on the Archimedes Series – with accompanying drawings

By Michael Roe

The crater Archimedes is the largest crater on the interior of Mare Imbrium. Located at 29.7ºN, 4.0ºW, it is 51 miles (83 km) in diameter with a lava-flooded floor and rather convex in form. The series of observations were made by me between 1991 April 22 and 1993 march 31. All observations were made with an 8" Celestron Schmidt Cassegrain x 220 magnification.

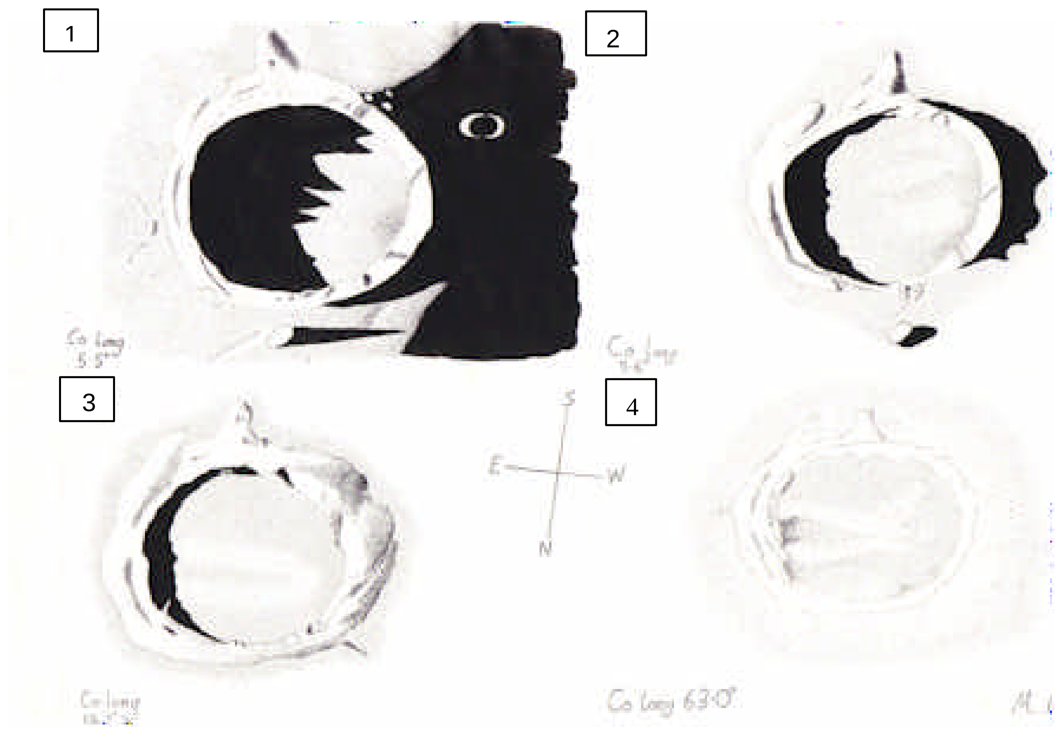


Figure 1 shows Archimedes at Co-longitude 5.5º, lat 1.5º. With four main peaks casting pointed shadows two thirds of the way across the smooth floor, the darker shaded western edge of the floor shows its convex form.

Just north of Archimedes a hill casts a very long shadow as long as the crater wall shadow itself. Details are on the inner and outer slopes are also visible.

Figure 2 at Co-long 9.6º, lat 1.1º. Reveals faint streaky marking on the floor of Archimedes and rocky hills on the northern rim. To the south is a hornlike projection seen at all illuminations. The crater wall shadows show that the floor is at the same level as the surrounding Mare Imbrium.

Figure 3 reveals at Co-long 14.1º, lat 1.5º. Many details on the outer walls terracing shows on the east side. On the north east inner wall a small projection appears. On the floor the light markings grow more prominent.

Figure 4 at Co-long 63.0º, lat 1.5º. It shows Archimedes in full sunlight. The light streaks, probably rays from Autolycus, are seen very well. Details on the east wall appear but most of the crater appears as a bright oval, difficult to draw realistically.

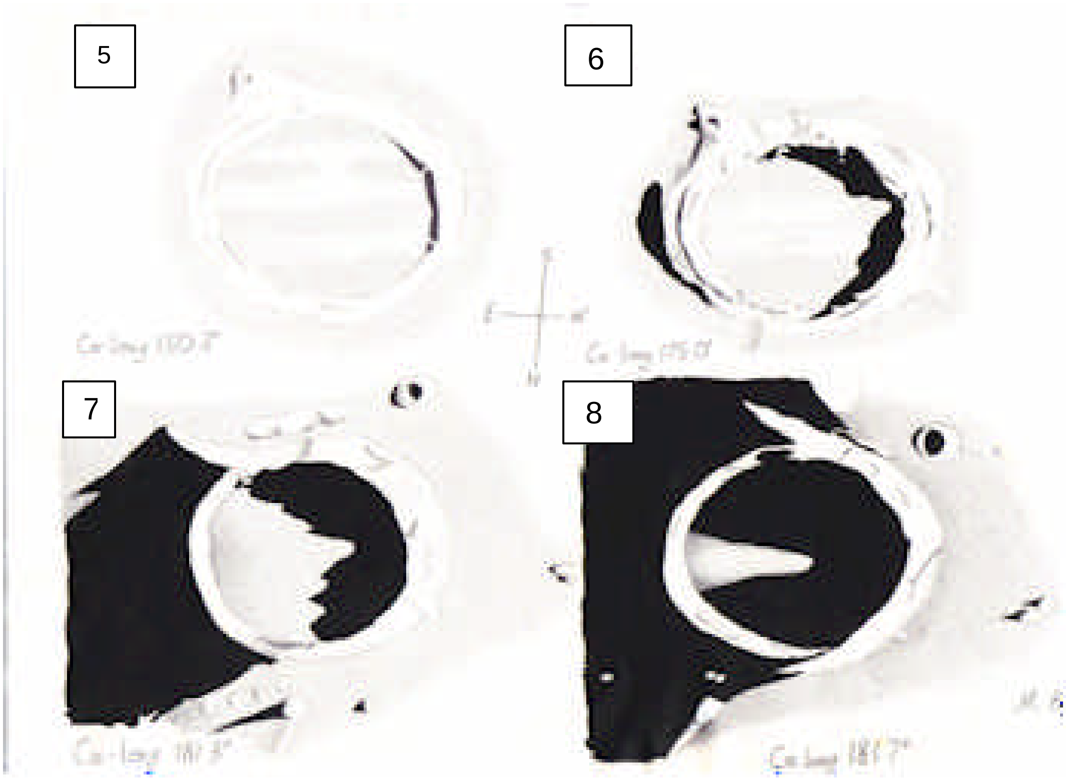


Figure 5 at Co-long 150.3º, lat –1.2º. The western inner wall begins to be shadowed. The floor has three parallel light bands and a crater at the horn-like projection.

Figure 6 at Co-long 175.0º, lat -1.2º. Only two light bands remain on the floor with two brighter spots on the northern band. Shadows of the crater walls increase, the west wall's show reveals a deep gap, a small nick in the wall and terracing appears all round the walls.

Figure 7 at Co-long 181.3º, lat 0.1º. Shows half the interior in shadow with six peaks and the gap. More surrounding features are shown including the tall hill to the north.

Figure 8 at Co-long 181.8º, lat –1.3º. The whole of Archimedes is covered in shadow for a comet shaped the gap. The west wall has a curved terrace surrounding the darker area.

First printed in British Astronomical Association magazine "The New Moon" July 1994.

Multiple Star Observations in May 2008 (Part 2)

O. S. 031/08 – Tuesday May 6th 2008 – As it had been a 'blue sky day' all day, I was not expecting it to last into the night. However, as it looked to be much clearer than of late, I set my refractor up at 22.15, using Alphecca to set up the Gotostar. As a test of my accuracy, or otherwise, I asked the Gotostar to find M 13. It did so very accurately, putting the star cluster right into the centre of a two-degree field. However, the view was seriously demoralising; according to Burnham a four inch telescope will begin to resolve the outer edge of the cluster into hundreds of individual stars but, obviously, not from my back garden. The reason was immediately obvious. It was clouding over directly above so I slewed some 120 degrees to the northwest and the Gotostar positioned 1 Camelopardalis right in the centre of the field without any further assistance from me. Cleanly split too at just 25x, better still at 40x though 80x appeared to overpower the conditions!

As the cloud cover was improving overall I returned to the area at the base of Bootes and decided to have a try at Struve 1772, the star I have failed to split on the last two observing sessions. Some success on this night though I must confess to a little cheating. Earlier in the day I had used the Internet at my local library and I had seen some drawings of this double star. Within a few degrees I knew where it would be so I was able to concentrate on that area. In my local conditions the secondary magnitude of 8.7 is right on the resolving power of my 102mm refractor (5.2 magnitudes gain over the naked eye) so this secondary star was just a tiny pinpoint of light overpowered almost forty times by its primary star. Anyway, poor though the view was, I have seen it!

At this point I nearly gave up. However, the night itself seemed to be improving with more stars clearly showing. Even 3.1 mag Pherkad was clearly on show so I continued!

I decided to have a look at a few doubles in Canes Venatici and found Struve 1755 with magnitudes of 7.2 & 8.1 and a separation of 4.4. The primary is a yellow star and there has been no movement between the two components since first measured by FGW Struve in 1832.

Another Struve star in Canes Venatici is Struve 1768 but its tight separation of 1.8 arc seconds was too much for my eyes on this night. This is a GB pair with a common orbital period of 240 years!

Then I had a look at the blood red carbon star, Y Canes Venatici, which is also known as 'La Superba' due to its crimson colour but on this night it looked more yellow-orange. Neat all the same against an inky black background!

Now I am back into Bootes and looking at Izar, epsilon Bootes, though it took me several minutes to make sure I was looking at the right star as there was no sign of the blue companion at first. I also looked at 20 Draco, a tight GB star that I split about eight months ago but no success this night, and then my old adversary, OS 525 in Lyrae. No success here either but I did come across two very interesting doubles nearby. These proved to be Struve 2470 and Struve 2474. Both seen at 25x and easily separated in a 40x field of view with almost identical magnitudes, separations and position angles. Now I wonder who put them there? Well they only look close in the two-dimensional view. Struve 2474 is actually 150 light years from Earth but Struve 2470 is considerably further away at some 1,350 light years!

O. S. 032/08 – Wednesday May 7th 2008 – The 3rd night in a row and the 4th in six nights. Perhaps eight hours of observing plus a similar length of time researching targets before or after, and quite a lot of time trying to improve the performance of my refractor's mount in the workshop is just too much. Going to bed at 04.00 messes up my circadian clock; little wonder then that I'm prone to headaches!

Conditions did not look quite as good as last night overall but I set my refractor up at 23.00 BST and used Alphecca to align the Gotostar. Found M92, M13 and M3 easily but the view of all three was really poor - just like 'out of focus' stars!

My first target was 95 Herculis, both components of which appeared silvery two nights ago despite the fact that the 'gentlemen (and gentlewomen)' of almost two centuries ago described numerous combinations of colours. At 40x I see the colours as silvery white and orange, which almost agrees with the spectra of A7 & G5, though an increase in magnification to 118x simply overpowered the conditions.

Next I looked at Rasalgethi, alpha Herculis, the primary of which was, at one time, one of the largest stars then discovered. The colours are supposedly red and yellow but I saw them on this night as yellow-orange and yellow-green with both components almost merged together so poor was the seeing in that part of the sky!

I'm now looking at delta Herculis and, somewhat surprisingly, I can split this pair at 59x despite the fact that delta itself is 109x brighter than its optical companion. These two stars have no gravitational connections, and are just like two ships passing in the night, albeit a very long night, delta proceeding almost due south and the dimmer star due west. When first measured by W Struve in 1830 the two stars were almost 26 arc seconds apart but by 1960 were only 9 arc seconds apart. Since then they are drifting away from each other and in a century or so will have no optical connections. Delta itself shows a slight wobble and is probably the brighter star of a spectroscopic binary.

I have now moved into Cassiopeia and am looking at one of Otto Struve's very wide doubles from his Index Catalogue of Wide Stars, OSS 254, which is very nicely split at only 25x, the colours appearing to be orangey red and yellowy green or very pale blue. Whatever, a neat wide double at low magnifications but hardly discernable at anything over 100x!

Still in Cassiopeia, I have found Little Albireo, which is Struve 3053 (also ADS 1) and nicely separated at 40x. Colours mimic the real Albireo being yellow and greenish blue (I would say turquoise though the secondary is not really bright enough in my local conditions to be sure). This pair is just to the south of Cederblad 214, a nebulosity much too dim to be seen in my telescope. There is also a wide third component that I have never resolved!

30 Cassiopeia was a bit more of a challenge as it was behind my garage roof but after a few minutes I could see a star coming into view and this proved to be my target. 30 Cass has the lowest declination of any stars in my list of doubles in Cassiopeia but was easily seen just above central Middlesbrough's greyish sodium haze.

A new multiple star to me was psi Cass but I have it wrongly recorded in my catalogue as a close double with a very wide third component. Despite its dimness, I could see this third star but, even using high magnifications, zero signs of splitting the bright star. So I had to move on and it was not until later did I find that it is the wide dim star that is the close double. I did not see that!

Next I came to Struve 163, which has magnitudes of 6.5 & 8.5 and a wide separation of 35 arc seconds. It is said to be a wide, colour contrasting double, which I would go along with, though I could not honestly say what the colours might be. Will have to wait until this pair is closer to my zenith!

Now to one of my favourite multiple stars, iota Cass, which is a gravitationally bound pair with a relatively wide cpm third star. All three beautifully separated at 118x; but can I still seem them at 100x? Yes, I can quite clearly, and even at 80x. So what about 59x? Well, maybe, as I have the advantage of knowing where the close companion is, but maybe not. Very impressive at 118x though despite the conditions.

After the Gotostar took the refractor on a very convoluted route, I am finally looking at sigma Cass, which is one of the few stars reputed to have a genuine green component. But not on this night though it is said that a six-inch glass is really needed to bring out the secondary colour. I would disagree as this star shows its green component in my four-inch refractor during late summer evenings.

Well, this is the end of my trip through the multiple delights of Cassiopeia, the only stars missed out from my catalogue being eta Cass (seen it many times) and 44 Cass (beyond my aperture).

Finally I had a go for the two little doubles I found last night in the east of Lyrae, and the Gotostar found them for me, both nicely split at 25x in the same field. Better at 40x however!

The Eclipse Gotostar performed brilliantly tonight and I only had to re-synchronise once in the two hours I observed. Some astronomers would say the goto system is cheating but as I can find most of these stars manually, I look upon it simply as a more comfortable way of observing. Fewer gymnastics behind the finder for this almost ancient amateur astronomer!

Part 3 next month

The Space Station as an Interplanetary Transport Vehicle?

written by Ian O'Neill

The ATV has carried out a series of boosts for the ISS (ESA)

The International Space Station (ISS) is the jewel in the crown of human ingenuity and a testament to the incredible engineering mankind is capable of. The modular human outpost began construction in 1998 and it is hoped the final configuration will be complete by 2010.

Apart from orbiting the Earth and the occasional re-boost by the docked Automated Transport Vehicle (ATV) "Jules Verne," the ISS is going nowhere in a hurry. But wait a minute, isn't that what the ISS is all about? Isn't it simply an orbital science outpost?

Well it is, but could it be something a bit more dynamic? Some critics cite the ISS as the most expensive waste of time the international collaboration of space agencies have ever been committed to; after all, who needs more zero-G experiments?
Solution: Attach a rocket and a steerage system and behold, we have a huge interplanetary transport vehicle, capable of travelling to the Moon and possibly to Mars. *Who needs the Constellation Program anyway!!!…*

In an entertaining Washington Post article, Michael Benson discusses something I've never thought about. Rather than letting the ISS gradually fade away to a perpetually orbital retirement and eventual re-entry, why not do something a little more exciting with the football pitch-sized manned outpost?

Forget more zero gravity experiments, stop throwing boomerangs around (yes, it came back), abandon the thousandth test on sprouting barley (although the beer might be good), install another toilet and let's get serious. Upgrade the ISS into a full-blown spaceship and let's begin exploring the Solar System in style!

So what's the logic behind this conclusion? The ISS has 15,000 cubic feet of habitable space in 10 modules. It has ample working and living areas with scope for more. It can repair itself (using the Canadian robotic arm, controlled from inside the craft). This creates a more than comfortable space habitat for five permanent crew members plus the occasional guest.

The space station has been billed as a "stepping stone" for future missions to the Moon and beyond, but those plans will probably not see the light of day in the ISS' lifetime. Besides, as the Constellation Program shows, "stepping stones" are not needed; NASA is favouring the direct flight route to the Moon and Mars, stopping for lunch at the ISS isn't necessary (besides, it's a waste in fuel and resources).

Also, space stations are not new. The Russians have had a series of seven manned outposts (from the 1971-86 Salyut and Mir programs) and the US had the 1973-79 Skylab station. There is a huge wealth of data available from the vast numbers of experiments that have been carried out, many present-day ISS "experiments" often appear to be slightly frivolous (i.e. the afore mentioned boomerang tests) when compared with the pioneering observations of the human body in space.

Artist impression of the final configuration of the ISS by 2010 (NASA)

All this said the ISS would be a great candidate for interplanetary travel. Although it might look a little ungainly, in the vacuum of space there's little concern for aerodynamics (besides, for a station orbiting at a speed of 17,000 miles/hr, its shape is hardly holding it back!). It's a tried and tested space-worthy candidate.

Plus, the Constellation Program would fit right in. Perhaps the Orion module could be integrated into the station, and the engines from the powerful Ares rocket could be attached for propulsion. If something a little gentler is required, ion propulsion engines are becoming more and more sophisticated. If you're thinking all of this is fantasy, well it isn't.

The station depends on "re-boosts" from docked resupply ships (such as Soyuz and the ATV) to occasionally increase its orbit. Back in April, Jules Verne pushed the 280 tonne station nearly three miles higher in only 12 minutes. This was achieved by using the small thrusters on the ATV; imagine if a larger thrust was achieved. Naturally, there may be structural questions hanging over the subject of thrust, but it seems only a small yet constant force is required for long-term interplanetary missions.

The International Space Station *could* be the ultimate "mother ship," where astronauts live, but small planetary missions can detach and land on the Moon or even Mars. Besides, the ISS is set for retirement in 2016, perhaps it could be reborn and refurbished (in time for the realisation of the Constellation Program) into a new class of space vehicle; not a space *station*, a space *exploration vehicle*. After all, it needn't only orbit the Earth…
Original Source: Washington Post

Transit Tailpieces

Articles : Please send contributions for the newsletter to Bob Mullen,

18 Chandlers Ridge, Nunthorpe, Middlesbrough, TS7 0JL, 01642 324939 (b2mullen@hotmail.com) Copy deadline date is the 20th of each month.).

For Sale :

Due to a recent near fatal attack of upgrade fever, I have for sale the following items:

- Celestron C5 Schmidt Cassegrain Optical Tube Assembly (OTA): D = 127 mm (5 inch), F/10 (i.e. F = 1270 mm).

  This is the old-style orange tube variety which I believe is far superior (with the exception of perhaps the coatings) to anything that has recently been produced by Celestron. Optically and mechanically in good condition.

  The OTA comes with the original 5 x 25 mm finderscope, and a piggy-back bracket for mounting e.g. a camera. A custom made adaptor which screws onto the standard SCT thread and accepts 24.5 mm accessories is supplied. However, the scope would benefit from a decent 2 inch SCT diagonal, which can be found quite cheaply nowadays. No tube rings are included; I used the camera mounting bracket to attach the scope to the mount, which was good enough for visual use. There is no dew shield.

  Price: £ 175 + 15 P&P.

- Custom built achromatic refractor: D = 76.2 mm (3 inch), F/4.725 (i.e. F = 360 mm).

  This telescope uses a fully coated Melles Griot industrial grade lens in a package which is similar to the various (e.g. SkyWatcher, Helios, etc.) Chinese short-tube refractors which flood the market these days. The lens cell has been threaded and blackened, and the tube and draw tube are fully baffled to minimise stray light. The draw tube was shortened to prevent vignetting.

  All in al a decent scope giving pleasant low-power views, but the visual appearance of the tube has been affected by a painting flaw. However, this is purely cosmetic and doesn't affect the performance. Complete with tube rings and 1¼ inch diagonal.

  Price: £ 65 + 15 P&P.

- EQ-5 / CG4 Equatorial Mount.

  Equatorial mount with single (RA) axis motor drive. Complete with aluminium tripod, polar finder scope and counter weight.

  This mount would make an ideal match for the Celestron C5 SCT.

  One of the tripod legs is damaged (i.e. the clamp which fixes the legs when extended is broken) which happened before when I bought the mount. However, this never bothered me as I always used the mount on a Meade Field Tripod. Can probably be fixed quite easily using a jubilee clip.

  Price: £ 135 + 30 P&P.

- SkyView DeLuxe Equatorial Mount.

  Equatorial mount with single (RA) axis motor drive. Similar to the well-known EQ-3 mount. Complete with aluminium tripod, polar finder scope and counter weight.

  This mount would make an ideal match for the 3 inch refractor.

  Price: £ 95 + 25 P&P.

- Meade Giant Field Tripod.

  As supplied with the 12" and 14" LX200 models. This is a HUGE tripod with 3 inch stainless steel legs providing a rock-steady base for any mount.

  These tripods are currently being advertised for £ 750 by Green Witch.

  I will ship(at buyer's cost), but please bear in mind that the cost of shipping may be very high.

  Sensible offers will be considered.

- Various eyepieces etc.:
  - ~ 40 mm wide field (~ 65 degrees) eyepiece (2 inch), unbranded (looks like military surplus): £ 25 + 5 P&P.

    - 20 mm Silver Top Plossl (1¼ inch): £ 12 + 3 P&P.
    - 17 mm Silver Top Plossl (1¼ inch): £ 12 + 3 P&P.
    - 10 mm Silver Top Plossl (1¼ inch): £ 12 + 3 P&P.
    - 7 mm Telescope House (Japan) Orthoscopic (1¼ inch): £ 25 + 3 P&P.
    - 25 mm Kellner (1¼ inch): £ 10 + 3 P&P.
    - 10 mm Kellner (1¼ inch): £ 10 + 3 P&P.
    - 2x Barlow (1¼ inch): £ 12 + 3 P&P.
    - 25 mm Celestron SMA (24.5 mm): £ 10 + 3 P&P. SOLD.
    - 9 mm Polarex Orthoscopic (24.5 mm): £ 15 + 3 P&P.
- Miscellaneous:
    - 24.5 mm zenith prism: £ 5 + 3 P&P.
    - 1¼ inch to 24.5 mm adaptor (needs blackening): £ 5 + 3 P&P. FREE to anyone who takes the Polarex eyepiece.
    - Finder bracket for SkyWatcher 9 x 50 finderscope (incl. rubber o-ring): £ 5 + 3 P&P.
    - Skalnate Pleso Atlas of the Heavens (1950.0), Antonín Becvár, Desk Edition (black stars on white background), 17 pages, 23½ x 15½ inch, unbound, Sky Publishing Corporation, 1949: £ 20 + 10 P&P.
    - Atlas Nieba Gwiazdzistego (2000.0), Jerzy Dobrzycki & Adam Dobrzycki, Desk Edition (black stars on white background with blue milky way), 27 pages, 42.5 x 30.5 cm, hard bound, Panstwowe Wydawnictwo Naukowe, 1989: £ 15 + 10 P&P.

I will consider all reasonable offers. Please contact me if you are interested in multiple items with a view to receiving a discount and combined P&P. Collection welcome.

Marc Dubbeldam

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