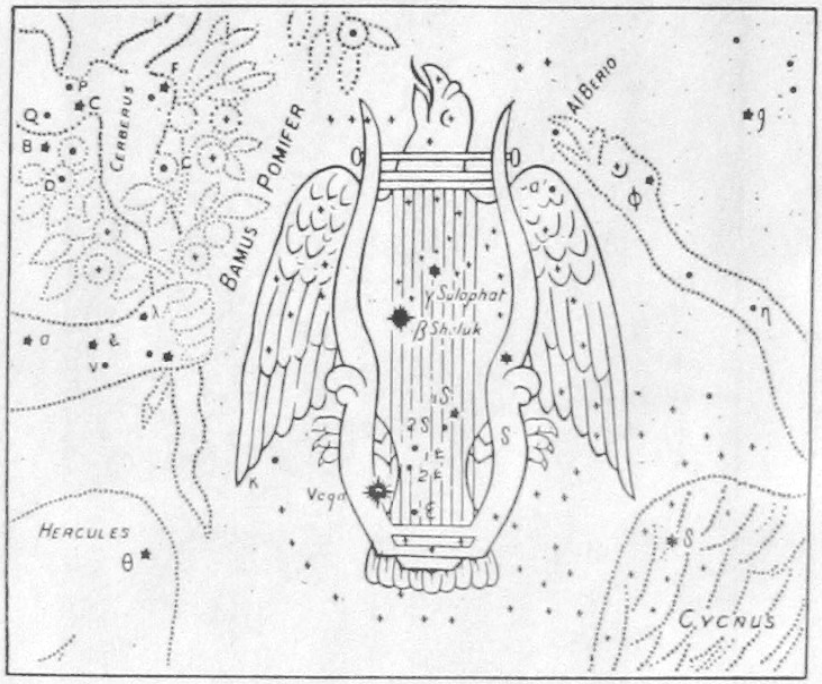
Cowichan Valley

StarFinders

Astronomy Society



LYRA, THE HARP

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Stardust

Season's Greetings to you all and welcome to a full Christmas edition of the StarFinders. This time you need to look up the chimney, i.e. go online, to enjoy some great images from members as well as some from more fortunate souls. The latter group includes folks that actually got to see and document Mercury's transit.

But whose to complain? At the time of writing these notes my computer barely dodged a brown out. While the Island was drowning under heavy rainfalls, I was ready to accept scrapping all the work that had been done up to that time. However, I'm not Mr. Tuttle and didn't feel like starting all over. Well, Seaside computers checked out my PC but could not find anything wrong, except dust clogged heat sinks and some junk files. BIG SIGH of relief, their tinkering was free, and I'm now protected by a battery powered surge protection device from APC. Ho, ho, ho!

If you were at the last meeting you might have noticed that the next president did not stand up. So, here are a few remarks that might help us getting our heads around this issue and move forwards. (i.e. what we need is eye relief!)
First of all, let's drop the labels. What we're looking for is who would consider leading the StarFinders. This'who' has to be a group of at least three people to make it work. There also has to be an affinity amongst this group, i.e. if they only cross paths at the odd meeting - that's not good enough. These directors would, on their time, i.e. over a glass of wine, beer, or herbal concoction, decide what's going to happen at the meetings and the island starparty. Surely, they'ld love to hear our input - but let's not forget, we voted for them - so let them lead! I'm also pretty sure, that if these three are getting along, one of them won't mind wearing the label of president.
So let's not waste precious time looking for another Nova, which we tend to ignore after one outburst, but rather look for a constellation, like the Pleiades, to take the bull by the horns and drag him across the sky. Assuming no friction, this is actually not work! (Finally, my physics courses are paying off!)
Now the question is: will a combination of sisters and brothers stand to boldly lead where so many have gone before? Remember this club is not governed by royal ascent. We can't pass the crown on to another heir/member. Just leave Corona Borealis in the sky and let's get on enjoying the heavenly splendours.

So thanks to Norm and Phyllis, for all their planning, cups of coffee, spending and the accounting thereof. I'm sure some are thinking 'the projectors have come down in price' but hey, where would we have been without one last year?! A big thanks also to our web master and all his minions for reestablishing a www presence. Let's all acknowledge this job in progress. It looks like they're rebuilding the Mines of Moria, if you know what I mean (Khazad-dum). Start thinking of memorable pass words!There also will be a presentation of 'The Lord of the Rings' at the January meeting. Neat images and info on Saturn and the Cassini's mission without any Hobbit loosing a finger.

Now you might be ready to take off your lens caps and turn on the red light, yours

Uli

Tuttle, who?

Hearing Passat, Civic, and Prius quickly puts our mind on cars. How about Tuttle-Giacobini-Kresek, Swift-Tuttle, and Temple-Tuttle? The comet thread we pick up is, of course, that of Horace Tuttle (1837-1923) who had started as an assistent astronomer at the Harvard College Observatory in 1857. In his first year, he discovered a periodic comet returning after 11 years. He followed that up by spying long period ones as well as more periodic comets and even minor planet 66 Maja and 73 Klystra.
In 1862 he joined the American Civil War. The following year he could be seen in Charleston Harbor making life hard for English blockade runners all the while continuing to observe comets aboard the USS Catskill. What didn't add up were his account books. Ulysses S. Grant approved Tuttle's sentence of embesseling $6000 and gave him the boot from the Navy.
Now these were the days without Meade or Island Eye Piece. So shopping online for pricy astro gear could not have been his problem. However, in those days such a discharge must have been like receiving the iron cross for valour, for only three weeks later we find him in the Rockies working as an astronomer for the US Geological Survey. (I guess there was no homeland security either.) But whether we can blame the tides or the salt water, the Navy's memory must have faded quickly as well, since they hired him back to carry out observing programs at the US Naval Observatory in 1884. Later, he delivered mail, wrote articles on popular astronomy, and die d with $70 to his name. And that's why, if you visit Oakwood Cemetery in Falls Church Virginia, you won't find a grave marker with his name.

Adapted from 'Comets' by Donald K Yeomans

Editor's note: Horace himself, despite many biographical matches, is not a periodic character returning as editor to the Cowichan Valley around the turn of the second millennium. However, if you haven't heard Marley's chains rattling for some time - see a friend and enjoy Scrooge until the skies clear again.

A transit by any other name ...

As I prepared the last issue I included some info on the 2006 Mercury Transit. As most of you, I've missed quite a few 'special' astro events. Some can be blamed on bad weather, the full moon, not being on the right continent, or unwilling to get out of bed for it. So I didn't give it much thought until the night of the meeting where Norm led the way by showing us images of Cambridge Bay.

This summer vacation was prompted by a family member's last year of working way up north and gave him and his wife an opportunity to ride an ATV across the barren landscape dotted with pizza size outcroppings of saxifrage interspersed with an alert weasel and birds of various feathers. Sleeping six feet above the under house septic tank and another two feet above the permafrost, bundled up in down jackets to ward off giant bugs, and seeing the sun all day must be an amateur astronomer's night mare particularly for those who enjoy the APOD (Astronomy Picture Of the Day) appear faithfully as the current wall paper on their PC. Luckily, Norm is an all round naturalist who also revels in six-pack dances and ponders recycling options for the one way north. And if it hadn't been for the broken ice pack, we would have lost our president to the arctic while attempting to recruit a polar bear for the next election. Finally, while many aspects of this trip had a dollar value to it, the overall experience was priceless.

Then it was Brian's turn to mention the transit on Wednesday. An event that happens only once every twelve years deserves some careful planning. Get the gear in the car that night. Check the weather forecast, oops! Nanaimo might be the only place with a crack of blue in the sky during the event. We just have to wait for the December dinner to find out how he fared.

Joining Roald Amundsen and the above mentioned fearless explorers, I made use of the morning sun to set up my scope and screen. And is that not Mercury beginning to creep across the Sun ?! Well, a quick look up in the newsletter, UT to PST conversion, and a reality check convinced me that I was looking at a lone sun spot. But hey, a sun spot by any other name ... To pass the time, I began pruning our London Plane tree ending up with enough sticks, nice and straight, to fence in an acre on Victoria Island. They must have been worth $100 a pole, given the lack of trees up there. However, I just ended up with a sore back, a chiropracter bill, and worst of all, a cloudy sky that sent raindrops my way. Didn't Sooke just about drown the other day? Why more rain on the day of the transit? A tear rolling down my cheek I tried clicking my heels and wailed “There's no place like Nanaimo, there's no place ... !” It didn't work, so I went back to labour the arborist way. What happened then was priceless. When my neighbour commented on my efforts of stacking little sticks I said “I had hoped to see the transit of Mercury in front of the Sun today, but alas the clouds ...” to which he replied “Well, maybe tomorrow.”

My final request is this: anybody heading up to Cambridge Bay, please take a copy of this issue and our club's uniquely fitting solar filter and put it in the wreck of the Amundsen, whose ribs, sticking out of the muck, probably point to the Northern Cross if it ever got dark enough.

But wait, hold the press, the phone is ringing. A voice tells me that I had been randomly selected to win a vacation to Florida! What are the chances of me being taken in? Thanks to the stories of fellow club members Norm and Brian, I decide to just hang up and busy myself with the prep of the next newsletter, a real need in dire times. And if you show up at the next meeting, you won't be disappointed.

Yours, Uli

Kuiper Belt Objects

MESSENGER Heads Past Venus, Next Stop: Venus

NASA's MESSENGER made its closest approach to Venus today, coming within 2,990 kilometers (1,860 miles) of its surface. The spacecraft used this close encounter with Venus' gravity well to alter its trajectory as it travels towards its final destination: Mercury. This won't be its final encounter with our twin planet, though. MESSENGER will meet up with Venus again in June 2007. It'll finally make its first encounter with Mercury in January 2008, but won't be in a final orbit until 2011.

Nearly a Thousand Years After the Death of a Star

In 1054 A.D., Chinese astronomers recorded the temporary brightening of a star in the constellation Taurus. Nearly 1000 years later, we look in the same region and see the exploded remnants of a dead star: the Crab Nebula. This composite photograph of the Crab Nebula was made by merging images from Hubble, the Chandra X-Ray Observatory, and the Spitzer Space Telescope. It shows only a hail of high-energy particles and expanding debris cloud that once was a massive star.

Globular Clusters Sort their Stars

Globular clusters are regions of space where stars are densely packed together - 10,000 times more dense than our local stellar neighbourhood. New evidence from the Hubble Space Telescope has shown that globular clusters will sort out themselves out, hoarding more massive stars in the centre, and pushing the less massive stars out to the edges. Hubble captured images of globular cluster 47 Tucanae for nearly 7 years, allowing astronomers to carefully plot the positions of stars moving in the cluster, and then calculate how close they were to the centre.

Black Holes About to Get Active Again

Astronomers have identified two distant supermassive black holes, or quasars, which might be about to get much brighter. New data from the Spitzer Space Telescopes show that the vicinities around the black holes could be backing up with excess matter - the black holes just can't consume it fast enough to clear the space. When this happens, the matter heats up, and releases a tremendous amount of energy. Some theories propose that these explosions could be so powerful they stop star formation in a galaxy.

Podcast: Getting Started in Amateur Astronomy

Got your eye on that $40 telescope at Walmart? Wait, hear us out first! Fraser and Pamela discuss strategies for getting into amateur astronomy - one of the most worthwhile hobbies out there. We discuss what gear to get, where to look, and how to meet up with other astronomy enthusiasts.

Astrophoto: The Witch Head Nebula by Richard Payne

Since 1989, when the first extra solar planet was detected, 180 planetary systems featuring 210 planets have been identified as of October 19, 2006. Each discovery has been a remarkable achievement. However, not one of these worlds has yet to be observed visually and there is not a shred of evidence that any are capable of harboring life, as we know it. But that has not throttled the creative energy of writers, television producers and movie directors from their unbridled speculation that the Universe is bursting with intelligent beings. In fact, the unprecedented discovery of these planets has seemed somewhat anticlimactic to science fiction fans raised on H.G. Wells, Gene Roddenberry and George Lucas tales. To many sci-fi buffs, science is simply confirming their long held

beliefs. For example, according to the Star Trek universe, Rigel, the off camera star which illuminates the accompanying picture, has twelve planets that support Federation colonies.

It Took More than an Asteroid to Kill the Dinosaurs

How did the dinosaurs die? It's a question scientists have been trying to figure out since their fossils were first discovered. Most believe that it was a giant asteroid that stuck the Yucatan peninsula 65 million years ago, and ended the dinosaurs' reign on Earth. But evidence is mounting that the asteroid strike might have just been the final killing blow. The previous 500,000 years were unpleasant too, with multiple meteor strikes, severe volcanism, and rapid climate change.

Gaps in Saturn's Rings

This Cassini image shows the dark gaps in Saturn's A ring, which are caused by a collection of moons. Even though these moons max out at a few dozen kilometres across, they have enough gravity to pull particles out of the ring orbit as they pass by. Cassini took this photograph on September 11, 2006 from a distance of 1.1 million kilometers (700,000 miles) from Saturn.

Baby Galaxies Weighed by Spitzer

Astronomers have discovered two of the most distant galaxies ever seen, when the Universe was only 700 million years old. The galaxies were first discovered as part of the Hubble Space Telescope's Deep Field Survey, which looked into the distant Universe. Astronomers then did follow-on observations with the Spitzer Space Telescope to confirm their distance and age. The galaxies are thought to be between 50-300 million years old, and have only 1% of the mass of our own Milky Way.

Young Star Grows Up Quickly

New images from the Japanese Subaru telescope show how a nearby young star ended its infancy rapidly. The star, called HD 141569A, has a hole in the disc of gas and dust surrounding it. Astronomers think that the star rapidly ionized its surrounding gas, and then pushed it away with its intense solar radiation. The gap is located about the same distance from the star as Saturn's orbit, and it lends additional evidence to theories about how discs of material evolve around young stars.

Spirit Celebrates 1,000 Days on Mars

NASA's Spirit Mars Exploration Rover recently celebrated its 1000th day on the surface of the Red Planet. To celebrate the occasion, NASA used the rover to capture a full 360-degree panorama view of Mars from its vantage point. The rover has been perched on the side of a hill for the last few months, to ride out the Martian winter' reduced light. Spirit and Opportunity were both expected to only last 90 days on the surface of Mars.

Astrophoto: From the Soul Nebula by Frank Barnes III

In June of 1889, about one year before his untimely death, the brilliant Dutch post-impressionist, Vincent Van Gogh, furiously completed *The Starry Night* while staying at the Monastery Saint-Paul de Mausole, a mental asylum located in Southern France. The painting depicts a humble village nestled between the blue tranquility of undulating hills and a magical sky filled with comet shaped clouds and cartwheeling stars the size of Ferris wheels. Even though Van Gogh only sold one painting during his lifetime, this priceless work of art has become an icon. In it he captured a childlike wonder that adults can recognize for who has not stood outside and been swayed by twinkling stars celebrating overhead. Beautiful deep space images can elicit similar excitement from astronomical enthusiasts. However, the photographers who produce them are more interested in the stars when they are peaceful.

Gamma Rays Pour From the Edge of a Supermassive Black Hole

Astronomers have discovered gamma rays streaming from the vicinity of the supermassive black hole at the heart of galaxy M87. These gamma rays have energy levels of more than a million million times the energy of visible light. Fortunately, these rays are stopped by our atmosphere. A special instrument called H.E.S.S., located in Namibia, can detect when these rays strike our atmosphere, and trace back the source. Astronomers have determined that a region not much larger than our Solar System around the black hole is responsible for this outpouring of gamma rays; the black hole is acting like a cosmic particle accelerator.

Janus Poses Above Saturn

This incredible photograph shows Saturn's potato-shaped Janus, posing above the planet's cloudy atmosphere. Janus is only 181 kilometers (113 miles) across, and it shows the scars of many impacts with other objects in the Solar System. Like Saturn's other smaller moons, Janus could be covered with a layer of fine, dust-sized icy material. Cassini took this photo on September 25, 2006 when it was only 145,000 kilometers (90,000 miles) from Janus.

Echos of Light

The strange variable star V838 Monocerotis flared up nearly 5 years ago, and astronomers have been trying to figure out what's going on ever since. As the light from the flare up propagates out from the star, it illuminates the surrounding cloud of dust. This light reflects off the dust, and we see this echo here on Earth. This latest photograph from the Hubble Space Telescope shows the changes that have happened over the last year. One interesting feature are the whorls and eddies in the dust, which could be caused by powerful magnetic fields.

New Planet Hunter Prepares for Launch

A powerful new instrument for finding extrasolar planets is about to launch: COROT (Convection Rotation and planetary Transits). Developed by the European Space Agency, COROT will search for planets using the transit method; it will be able to detect the slight drop in brightness as a planet moves in front of its parent star. If the observatory performs as expected, it should be able to detect rocky worlds just a few times larger than the Earth. COROT is scheduled to launch in December, 2006.

The Quantum Zoo - A Tourist's Guide to the Neverending Universe

Modern physics! Who knows where it's going? Objects so small that we can never see them. Strings that vibrate with the resonance of life. A universe so big and growing, yet starting from no more than a dot. Surely all this is too much! Not so. Marcus Chown in his book, 'The Quantum Zoo - A Tourist's Guide to the Neverending Universe' provides simple analogies and fun derivations to bring sense to all this. After all, physics is simply the science of observation, so there shouldn't be anything holding back an inquisitive person.

A New Target for Deep Impact

NASA announced today that it will be extending Deep Impact's mission, giving it a chance to visit another comet. The mission made big news when it slammed an impactor spacecraft into Comet Tempel 1 in July, 2005. NASA had hoped they could steer

the spacecraft past another comet, to continue its scientific discoveries. Mission planners chose Comet Boethin as the spacecraft's next target, which it should be able to reach in December, 2008.

Subtle Saturn

This beautiful view of Saturn was taken by Cassini when it was looking through the dark side of the planet's rings. The diagonal slice through the photo is Saturn's shadow falling across the rings. Cassini took this image on September 11, 2006 when it was approximately 1.1 million kilometres (700,000 miles) from Saturn.

Dark Nebula Slithers Across the Sky

This Spitzer photograph contains several nebulae located in the galactic plane of the Milky Way. The dark, snake-like nebula at the upper left contains dozens of huge newborn stars, some with 50 times the mass of our Sun. The red sphere in the image is a supernova remnant. Before it exploded, the central star probably played a role in the creation of the dark nebulae in the region.

Supercomputer Simulates Stellar Evolution

One of the most powerful supercomputers on Earth has simulated the interiors of low mass stars, helping scientists understand their evolution. As these stars exhaust their hydrogen fuel, they eject helium into their surrounding neighbourhood. But the quantities of this ejected helium didn't match observations by telescopes. This new simulation shows that stars can actually destroy some of this helium inside the star, instead of ejecting it into space.

NASA is Go for Hubble Repair

Finally some good news for the Hubble Space Telescope. NASA announced a new space shuttle mission to repair and upgrade the aging space telescope. This fifth and final visit to Hubble is tentatively scheduled for Fall 2008. Astronauts will install two new instruments: the Cosmic Origins Spectrograph, which will help probe large-scale structures in the Universe, and the Wide Field Camera 3, a very sensitive instrument capable of seeing from infrared to ultraviolet wavelengths.

Podcast: Meteor Showers. Yes, the Sky is Falling

Dress warmly, gather some friends and family, and head outside to watch sand burn in the upper atmosphere. There's nothing like a good meteor shower. Fraser and Pamela explain this beautiful phenomenon: what causes them, the best storms and showers to watch for, and different types of meteors you might see.

AKARI's Infrared View of the Large Magellanic Cloud

This photograph, taken by the Japanese Space Agency's AKARI spacecraft, shows the Large Magellanic Cloud - a satellite galaxy to the Milky Way visible from the Southern Hemisphere. The spacecraft is in the process of scanning the entire sky in the infrared spectrum. This view of the Large Magellanic Cloud shows how the distribution of gas and dust that forms a disk-like structure. The bright region in the bottom-left of the image is the famous Tarantula Nebula, where many new stars are forming.

A Star Peeks Through Saturn's Rings

This Cassini image shows a star peeking through Saturn's rings. Scientists use these kinds of images to study the thickness and consistency of the rings. As the light from the obscured star dims and brightens, it can give researchers clues about how various features might have formed. Cassini took this image on September 26, 2006 when it was approximately 515,000 kilometers (320,000 miles) from Saturn.

Super-Supermassive Black Hole

The Hubble Space Telescope, the Chandra X-Ray Observatory, and the National Radio Astronomical Observatory teamed up to produce this composite image of galaxy cluster MS0735.6+7421, located about 2.5 billion light-years from Earth. The cluster contains dozens of galaxies held together by galaxy. A truly supermassive black hole lurks at the heart of this cluster, containing more than a billion solar masses. The red areas are twin jets of material streaming away from the black hole.

First Light Looks Bright for Hinode

Japan's newly-launched Hinode spacecraft has captured its first images of the Sun. Formerly known as Solar-B, the spacecraft launched on September 22, and opened its instruments to space on October 23, 2006. This image shows granules on the Sun's surface, each of which is thousands of kilometres across. Over the course of the next month, mission controllers will continue to put the spacecraft through its paces. They expect to release their first scientific data in December.

Year in Space 2007 Desk Planner

Once again, the Year in Space 2007 calendar is sponsoring Universe Today as we move towards the holidays. I'll be featuring the calendar on the website and in the newsletter until the end of the year. This 144-page spiral-bound desk calendar has 53 full-colour space photographs, so you can gaze into infinity as you plan your week. It's filled with space trivia, sky events, daily Moon phases, and additional calendars. Universe Today readers can save at least 25% off the suggested retail price and pay only $11.95 USD by ordering online. There's free shipping in the U.S.,and deeper discounts for multiple copies. You can also download a cool poster containing all the images in this year's calendar. Check it out! Visit the Year in Space 2007 website for more information, or to order a copy online. www.yearinspace.com

eZipSky Astronomical Text Messages

I hope you all know by now that Universe Today publishes a daily guide of what you can see in the night sky every single night - Astronomy What's Up. I just found out about a related service that sounds interesting. It's called eZipSky, and they'll send your cellphone an SMS text message whenever there's something interesting happening in the night sky. Another cool feature is that they can send you an alert 30 minutes before the International Space Station will fly over your part of the sky. I haven't had a chance to test it out with my cell phone, but they offer a free 10-day trial, so you can give it a try. If you do sign up, they charge $2.95/month for the service. Great idea! Check out their site at www.ezipsky.com Fraser Cain Publisher Universe Today

Spitzer and Hubble View Orion

This beautiful photograph is of a region in the Orion Nebula called the Trapezium. It was taken by merging images together from two of the Great Observatories: Hubble and Spitzer. The swirls of green are ultraviolet and visible images revealed by Hubble, while the reds and oranges are infrared detected by Spitzer. At the heart of the photograph lurk 4 massive stars, each of which is 100,000 times brighter than our own Sun. The nebula is located about 1,500 light years from the Earth, and can be seen in small telescopes or binoculars.

Killer Solar Flare… on Another Star

NASA's Swift satellite has spotted one of the most powerful stellar flares ever seen. Fortunately, this killer blast happened on a star located about 135 light-years from Earth. Had the flare

occurred on the Sun, it would have triggered a mass extinction on our planet. The flaring star, II Pegasi, has a stellar companion in a very tight orbit. Their interaction has caused the tidally locked stars to spin very quickly. It's this rapid rotation that leads to powerful stellar flares.

The Early Earth's Atmosphere was Similar to Titan

The thick organic haze that shrouds Titan is similar to what we had here on Earth billions of years ago; an environment that might have helped early life get a foothold. NASA researchers set up several experiments that reproduced the atmosphere in the early Earth and Titan today. The Earth experiments produced tremendous amounts of organic material, which could have been one of the ways life first appeared.

Podcast: Einstein's Theory of Relativity

It's all relative. How many times have you heard that? Well, when you're traveling close to the speed of light, everything really is relative; especially the passage of time. This week, Fraser and Pamela give you the skinny on Einstein's Special Theory of Relativity. After listening to a few thought experiments, you too should be able to wrap your head around this amazing theory.

Bizarre Lunar Orbits

Nov. 6, 2006: Near the end of the mission of Apollo 16, on April 24, 1972, just before returning back home to Earth, the three astronauts released one last scientific experiment: a small "subsatellite" called PFS-2 to orbit the Moon about every 2 hours.

The intention? Joining an earlier subsatellite PFS-1, released by Apollo 15 astronauts eight months earlier, PFS-2 was to measure charged particles and magnetic fields all around the Moon as the Moon orbited Earth. The low orbits of both subsatellites were to be similar ellipses, ranging from 55 to 76 miles (89 to 122 km) above the lunar surface.

Instead, something bizarre happened.

The orbit of PFS-2 rapidly changed shape and distance from the Moon. In 2-1/2 weeks the satellite was swooping to within a hair-raising 6 miles (10 km) of the lunar surface at closest approach. As the orbit kept changing, PFS-2 backed off again, until it seemed to be a safe 30 miles away. But not for long: inexorably, the subsatellite's orbit carried it back toward the Moon. And on May 29, 1972—only 35 days and 425 orbits after its release—PFS-2 crashed.

What happened? The Moon itself plunged the subsatellite to its death. That's the conclusion of Alex S. Konopliv, planetary scientist at NASA's Jet Propulsion Laboratory in Pasadena. He and several colleagues have been analyzing the orbits of various Moon-orbiting satellites since PFS-2, notably the 1998–99 mission of Lunar Prospector.

"If the Moon were a uniform sphere, you could have an orbit that was perfect ellipse or circle," Konopliv explained. "The Moon has no atmosphere to cause drag or heating on a spacecraft, so you can go really low: Lunar Prospector spent six months orbiting only 20 miles (30 km) above the surface."

So why did PFS-2, which was inserted into an elliptical orbit that originally carried it from 52 miles (97 km) to 66 miles (120 km), end up as a kamikaze blast of broken aluminum struts and solar panels?

"The Moon is extraordinarily lumpy, gravitationally speaking," Konopliv continues. "I don't mean mountains or physical topography. I mean in mass. What appear to be flat seas of lunar lava have huge positive gravitational anomalies—that is, their mass and thus their gravitational fields are significantly stronger than the rest of the lunar crust." Known as mass concentrations or "mascons," there are five big ones on the front side of the Moon facing Earth, all in lunar maria (Latin for "seas") and visible in binoculars from Earth.

The mascons' gravitational anomaly is so great—half a percent—that it actually would be measurable to astronauts on the lunar surface. "If you were standing at the edge of one of the maria, a plumb bob would hang about a third of a degree off vertical, pointing toward the mascon," Konopliv says. Moreover, an astronaut in full spacesuit and life-support gear whose lunar weight was exactly 50 pounds at the edge of the mascon would weigh 50 pounds and 4 ounces when standing in the mascon's center.

"Lunar mascons make most low lunar orbits unstable," says Konopliv. As a satellite passes 50 or 60 miles overhead, the mascons pull it forward, back, left, right, or down, the exact direction and magnitude of the tugging depends on the satellite's trajectory. Absent any periodic boosts from onboard rockets to correct the orbit, most satellites released into low lunar orbits (under about 60 miles or 100 km) will eventually crash into the Moon. PFS-2 released by Apollo 16 was simply a dramatic worst-case example. But even its longer-lived predecessor PFS-1 (released by Apollo 15) literally bit the dust in January 1973 after less than a year and a half.

So what does this mean for eventual lunar exploration?

Be careful of the orbit chosen for a low-orbiting lunar satellite. "What counts is an orbit's inclination," that is, the tilt of its plane to the Moon's equatorial plane. "There are actually a number of 'frozen orbits' where a spacecraft can stay in a low lunar orbit indefinitely. They occur at four inclinations: 27º, 50º, 76º, and 86º"—the last one being nearly over the lunar poles. The orbit of the relatively long-lived Apollo 15 subsatellite PFS-1 had an inclination of 28º, which turned out to be close to the inclination of one of the frozen orbits—but poor PFS-2 was cursed with an inclination of only 11º.

Alternatively, if there are mission reasons for choosing a non-frozen orbital inclination, plan to do frequent course corrections. Lunar Prospector had to do a maneuver every two months to keep itself in its initial circular orbit of 60 miles (100 km)—and more often than once a month when it was orbiting at only 20 miles (30 km) altitude. When its fuel tank was nearly empty, the scientists knew its end was near, so they deliberately crashed it on July 30, 1999, near the Moon's south pole to observe its plume of lunar dust. After a year and a half, the Moon had claimed the spacecraft for its own.

Bottom line, says Konopliv: "Carry plenty of fuel."

A Brief History of Stephen

I first thought it would be a good movie to watch during one of our club meetings; however, after spending 80 minutes with Stephen's family members, academic friends, and the device that gives him a voice illuminating his life and achievements I decided to write a brief summary instead.
The movie, in short, is biographical in nature rather than a visual reading of the book with the same title. It's a good idea however to have read 'A Brief History Of Time' in order to be briefed on Stephen's work in the 1980's. If you're someone who prefers an even briefer version, just go to **www.generationterrorists.com** and look for a 'page' with reams of nicely organized quotations from the book.
Born in Oxford, avoiding the wartime bombing of London, Stephen grew up in a family quite used to each reading their own book at the dinner table. His sister enjoyed playing Monopoly with him but quit when he decided to add to the rules. He later invented his own board game 'Dynasty' with such complicated rules that, once started, would 'never' end.
According to his own calculations, he put about an hours work into each day towards his undergraduate degree at Oxford. Needless to say, he finished at the bottom. Once his examiners found out that given a 'first' he planned on continuing at Cambridge and with a 'second' he would stay at Oxford, they did not hesitate in sending him off with a 'first'. Hindsight awards Cambridge not only with an excellent graduate, but also with someone worthy of occupying the chair of Lucassian Professor of Mathematics, once held by Isaac Newton.
It was during his undergrad days that he was diagnosed with ALS, the motor neurone disease that made him stumble, fall, loose mobility, ability to write, and finally to speak.
Given two and a half years to live, Stephen made a conscious choice for life and to apply himself towards a topic whose investigation would not be hampered by his disability. He opted against sorting elementary particles and quantum physics and chose Einstein's theory of relativity and the cosmos instead. Penrose's discovery of the final days of a heavy star, i.e. collapse into a singularity, gave him the thought of matching this idea with that of the Big Bang. QED, yes, he was able to prove it by turning the arrow of time. Later, while it was Wheeler who came up with the term black hole, it was Hawking who again proved that via a radiation named after him, such a hole will eventually evaporate and not violate thermodynamics law of increasing entropy.
Those 2 ½ years have since turned into forty and he's now celebrating his 64th birthday. While not wishing ALS on anybody, his mother makes the observation that it was the dream of waking up to see the hang man that motivated him to focus his ability and energy towards finding answers to questions scientists, philosophers, and the ordinary person on the street have asked for centuries.
In conclusion, this is not a movie helping you in your quest to understand cosmology, but rather a time lapse of Stephen Hawking's journey to own a special gift, life! Stephen may have doubts about a creator but I can't help but point out that the gift presupposes a giver.

Uli

Following is an even briefer selection of those found on the web:

Today scientists describe the universe in terms of two basic partial theories - the general theory of relativity and quantum mechanics... The general theory of relativity describes the force of gravity and the large-scale structure of the universe, that is, the structure on scales from only a few miles to as large as a million million million million (1 with twenty-four zeros after it) miles, the size of the observable universe. Quantum mechanics, on the other hands, deals with phenomena on extremely small scales, such as a millionth of a millionth of an inch. Unfortunately, however, these two theories are known to be inconsistent with each other - they cannot both be correct.

A remarkable feature of the first kind of Friedmann model is that in it the universe is not infinite in space, but neither does space have any boundary. Gravity is so strong that space is bent round onto itself, making it rather like the surface of the earth. If one keeps traveling in a certain direction on the surface of the earth, one never comes up against an impassable barrier or falls over the edge, but eventually comes back to where one started.

The event horizon , the boundary of the region of space-time from which it is not possible to escape, acts rather like a one-way membrane around the black hole... One could well say of the event horizon what the poet Dante said of the entrance to Hell: “All hope abandon, ye who enter here.” Anything or anyone who falls through the event horizon will soon reach the region of infinite density and the end of time.

A black hole with a mass of a few times that of the sun would have a temperature of only one ten millionth of a degree above absolute zero... If the universe is destined to go on expanding forever, the temperature of the microwave radiation will eventually decrease to less than that of such a black hole, which will then begin to lose mass. But, even then, its temperature would be so low that it would take about a million million million million million million million million million million years to evaporate completely.

We see the universe the way it is because we exist.

There are something like ten million million million million million million million million million million million million million million million million (1 with eighty zeroes after it) particles in the region of the universe that we can observe. Where did they all come from? The answer is that, in quantum theory, particles can be created out of energy in the form of particle/antiparticle parts. But that just raises the question of where the energy came from. The answer is that the total energy of the universe is exactly zero. The matter in the universe is made out of positive energy. However, the matter is all attracting itself by gravity. Two pieces of matter that are close to each other have less energy than the same two pieces a long way apart, because you have to expend energy to separate them against the gravitational force that is pulling them together. Thus in a sense, the gravitational field has negative energy. In the case of a universe that is approximately uniform in space, one can show that this negative gravitational energy exactly cancels the positive energy represented by the matter. So the total energy of the universe is zero.

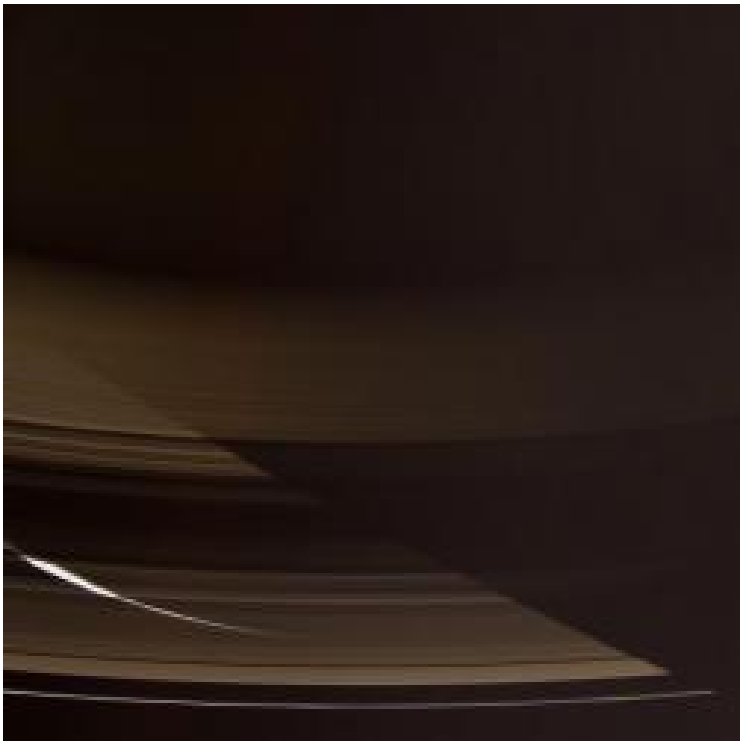
Now twice zero is also zero. Thus the universe can double the amount of positive matter energy and also double the negative gravitational energy without violation of the conservation of energy.

“It is said that there's no such thing as a free lunch. But the universe is the ultimate free lunch.”
The idea that space and time may form a closed surface without boundary also has profound implications for the role of God in the affairs of the universe. With the success of scientific theories in describing events, most people have come to believe that God allows the universe to evolve according to a set of laws and does not intervene in the universe to break these laws. However, the laws do not tell us what the universe should have looked like when it started - it would still be up to God to wind up the clock and choose how to start it off. So long as the universe had a beginning, we could suppose it had a creator. But if the universe is really completely self-contained, having no boundaries or edge, it would have neither beginning nor end: it would simply be. What place, then, for a creator?
Einstein once asked the question: “How much choice did God have in constructing the universe?”

Even if there is only one possible unified theory, it is just a set of rules and equations. What is it that breathes fire into the equations and makes a universe for them to describe?... Why does the universe go to all the bother of existing? Is the unified theory so compelling that it brings about its own existence? Or does it need a creator, and, if so, does he have any other effect on the universe? And who created him?

Now that you've read that much, you might as well get the book from the library and read it all!

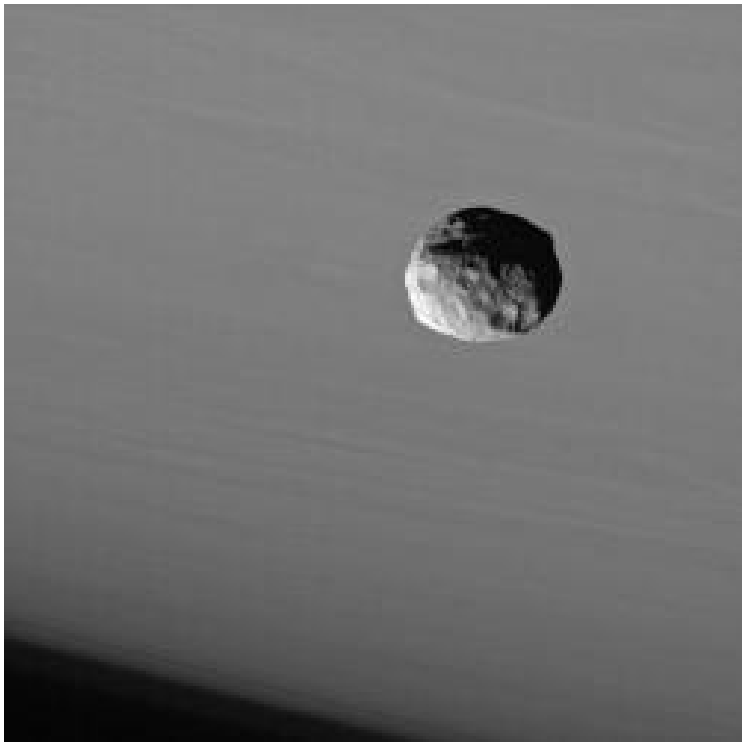
Spitzer and Hubble View Orion



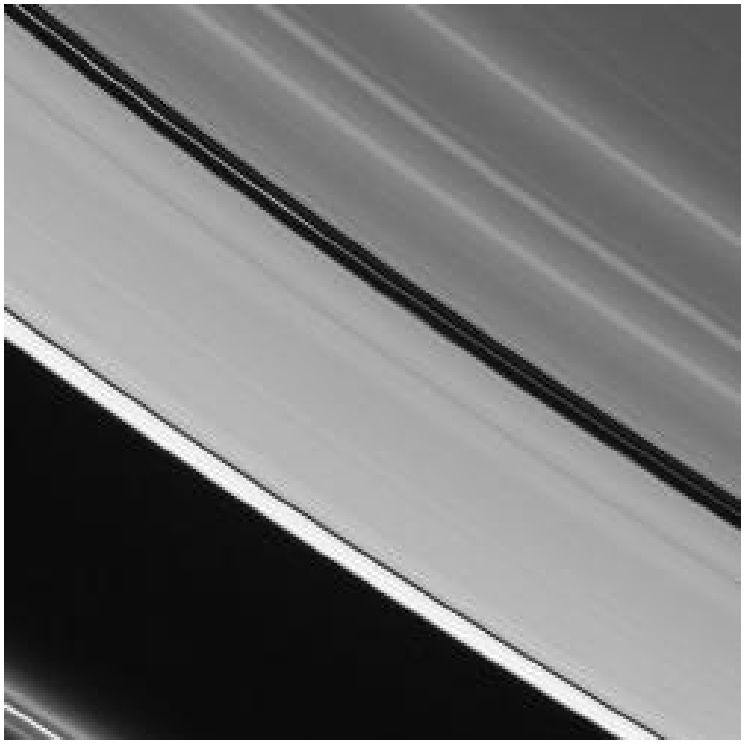
Dark side of Saturn’s rings. Image credit: NASA/JPL/SSI

Astrophoto: M83 Image by: R Jay GaBany

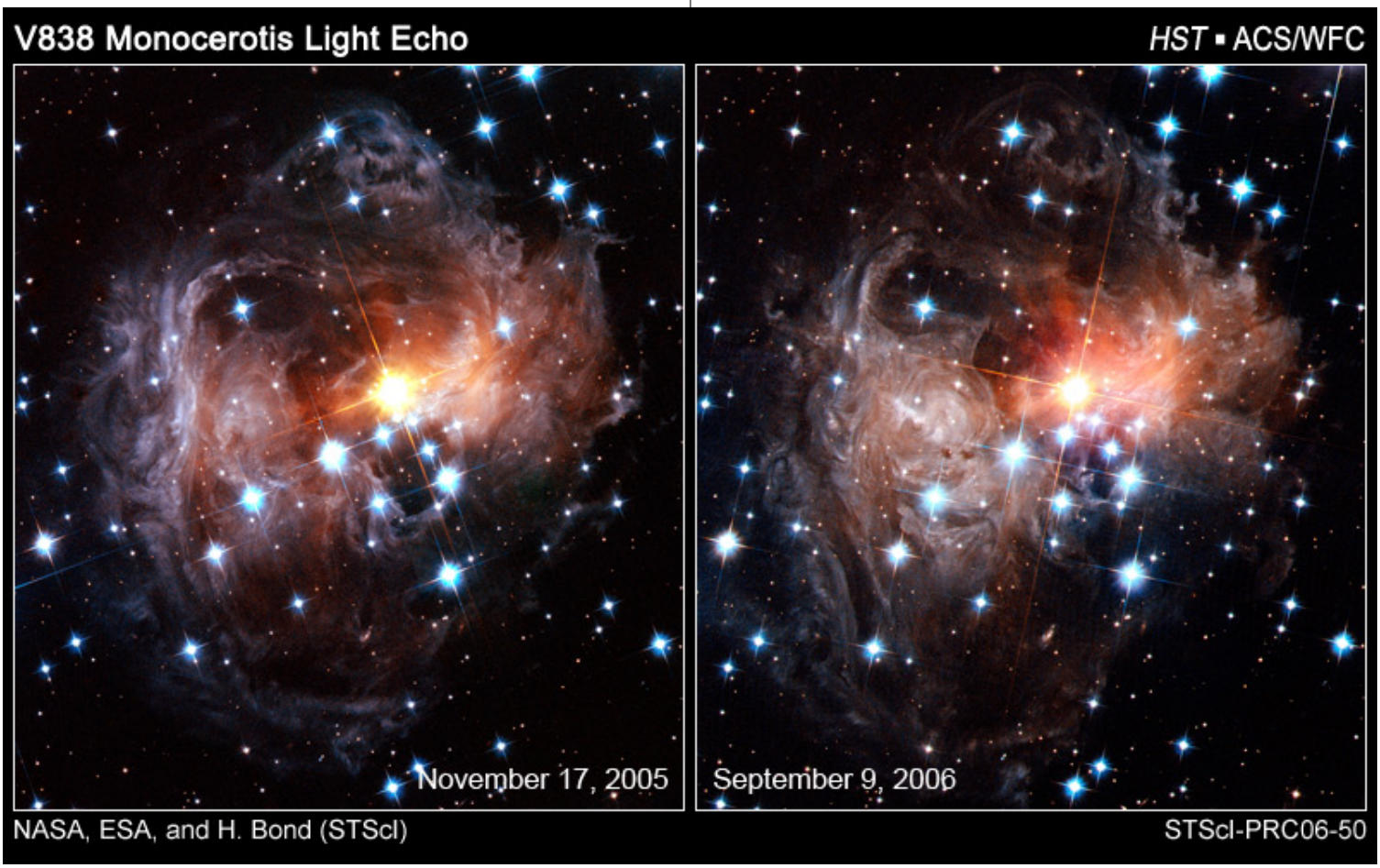
Astrophoto: IC 1848 Image by: Frank Barnes III



Janus in front of Saturn. Image credit: NASA/JPL/SSI

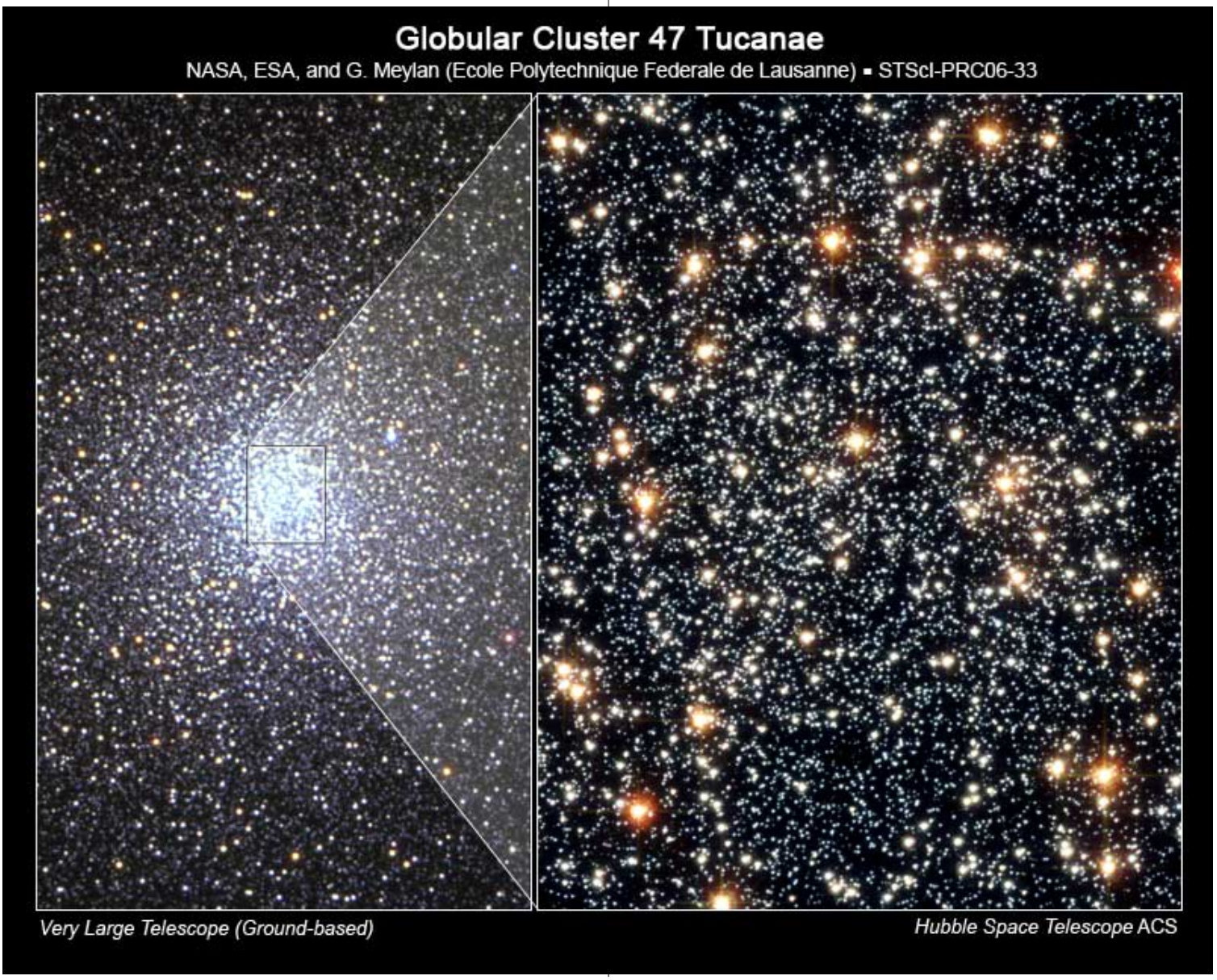


Gaps in Saturn's A ring. Image credit: NASA/JPL/SSI

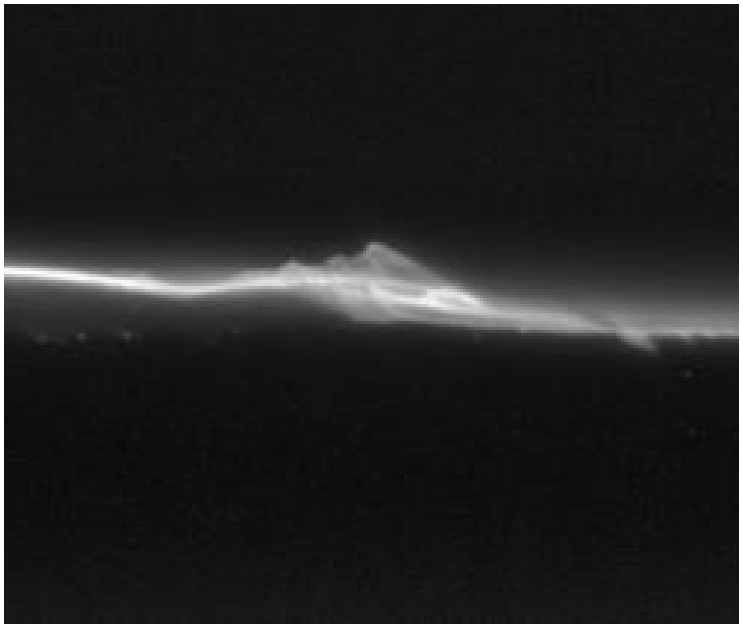


X-ray image of the Crab Nebula. Image credit: Chandra

M31 Andromeda. Image credit: (amateur photographer) Tom Davis



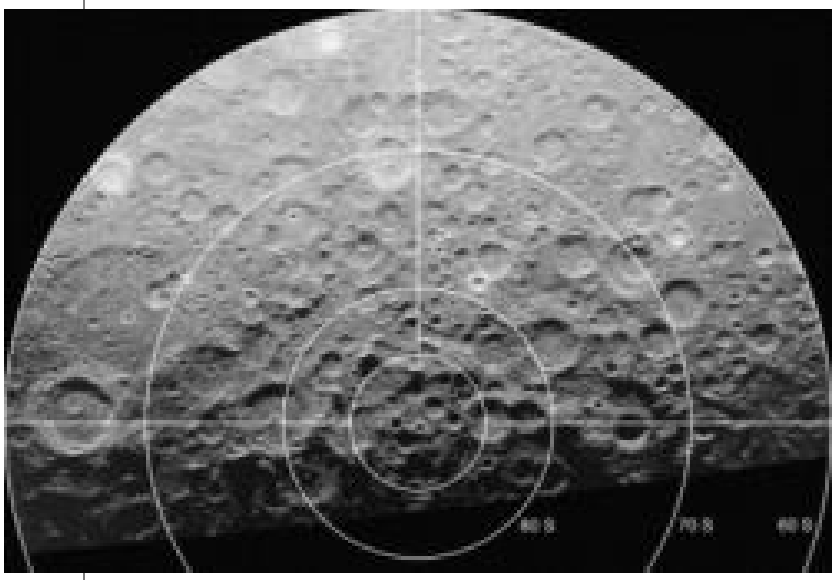
M75 - Credit: NOAO/AURA/NSF



Streamer in Saturn’s Ring. Image credit: NASA/JPL/SSI

Astrophoto: The Witchhead Nebula Image by: Richard Payne

Moon’s southern pole. Image credit: Bruce & Don Campbell



Here is an image taken Halloween night. For the past 8 years I have set up the telescope at the end of the drive-way, so the kids can have a peek thru it. This year it was on the waxing gibbous moon, so they got to see the terminator, and mountains sticking up from the shadows. It is amazing how excited the teens get! The parents of small tots are also captivated, as most have never looked thru a scope, and have never seen the moon up close. It is loads of fun!
Norm

Editor's note: Norm's wearing indoor gear by Cam-bridge Bay standards. The foggy condensation is also a lower latitude manifestation - up there, it's so dry, you have to drink beer in six-pack form or else your beer-stein's content evaporates before you can say trick or treat.

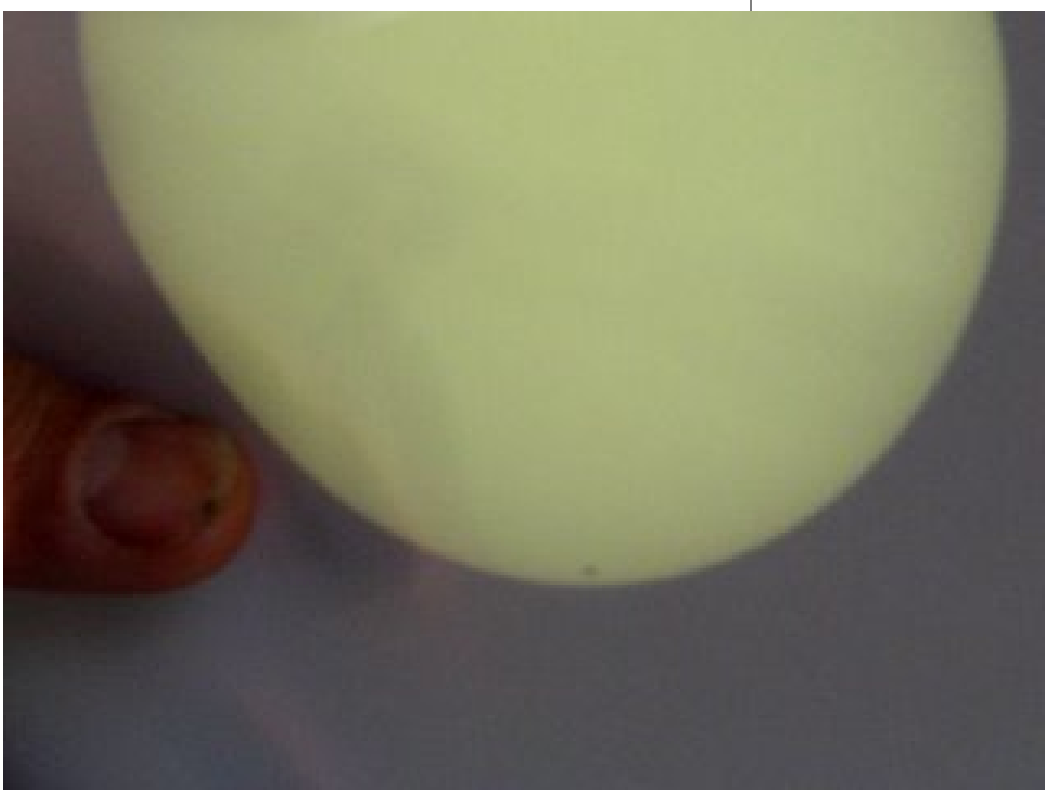
The images on the previous pages are only available in our web version of the StarFinders and have been imported from UniverseToday.com - Oct/Nov 06. The starchart on the final page, on the other hand, only comes in printed form.

Designer Gear,

or stuff you can't find on Brian's website.

But by following these guide lines, you also will be able to observe, sketch, and take pictures of your favourite sun spots.

*take a piece of white card stock and tape it to
*the cover of a Sony VCR (it recently broke down and neaded to be gutted)
*attach the cover with two zip straps to a lamp stand (the one you trip over in your workshop)
*to compensate for the sun's position in the sky attach a chop stick with masking tape - adjust until the egg shape sun is round again
*PS in order for the last step to work the Sony cover needs to be on the other side of the lamp stand, but you wouldn't have made that mistake in the first place.



You might notice that the above strategy allows you to adapt just about any Christmas gift and turn it into a much needed gadget for your astro observing needs.

For future tips just e-mail me.
Yours with or without duct tape
Uli

Mercury and the Chromosphere
Credit & Copyright: Phil Jones
Explanation: Enjoying Wednesday's transit of Mercury from Dallas, Texas, astronomer Phil Jones recorded this detailed image of the Sun. Along with a silhouette of the innermost planet, a network of cells and dark filaments can be seen against a bright solar disk with spicules and prominences along the Sun's edge. The composited image was taken through a telescope equiped with an H-alpha filter that narrowly transmits only the red light from hydrogen atoms. Such images emphasize the solar chromosphere, the region of the Sun's atmosphere immediately above its photosphere or normally visible surface. Left of center, the tiny disk of Mercury seems to be imitating a small sunspot that looks a little too round. But in H-alpha pictures, sunspot regions are usually dominated by bright splotches (called plages) on the solar chromosphere.

The Ghostly Tail of Comet SWAN
Credit & Copyright: Ray Gralak