PETERBOROUGH ASTRONOMICAL ASSOCIATION

THE REFLECTOR

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Hubble directly observes a planet orbiting another star

WASHINGTON — NASA's Hubble Space Telescope has taken the first visible-light snapshot of a planet circling another star.

Estimated to be no more than three times Jupiter's mass, the planet, called Fomalhaut b, orbits the bright southern star Fomalhaut, located 25 light-years away in the constellation Piscis Australis, or the "Southern Fish."

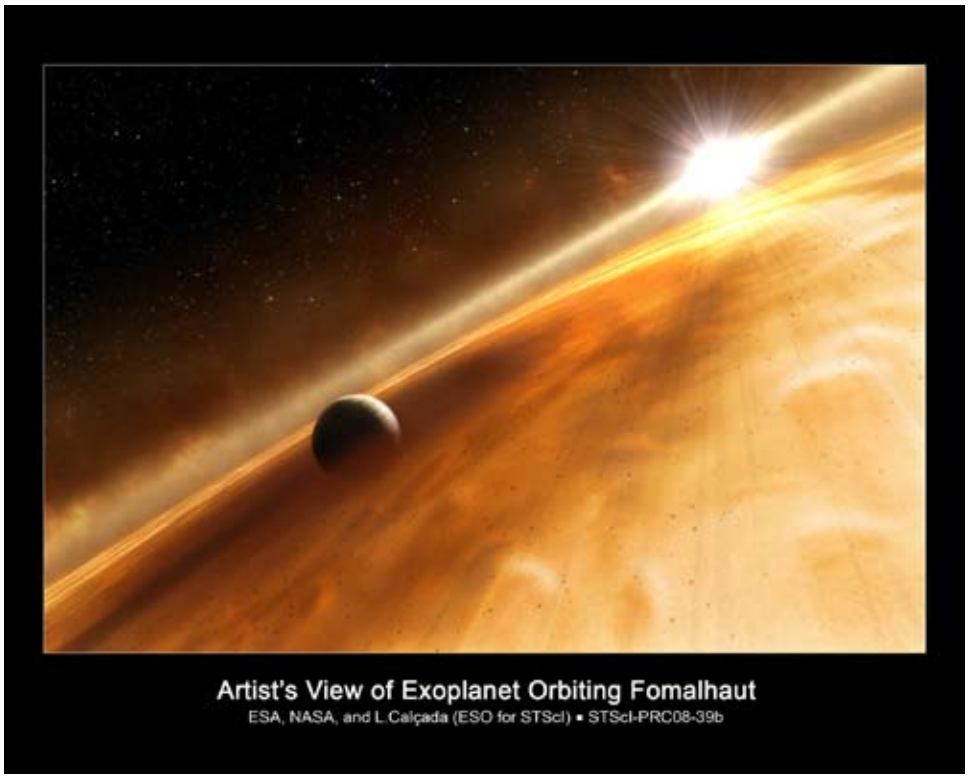
Fomalhaut has been a candidate for planet hunting ever since an excess of dust was discovered around the star in the early 1980s by NASA's Infrared Astronomy Satellite, IRAS.

In 2004, the coronagraph in the High Resolution Camera on Hubble's Advanced Camera for Surveys produced the first-ever resolved visible-light image of the region around Fomalhaut. It clearly showed a ring of protoplanetary debris approximately 21.5 billion miles across and having a sharp inner edge.

This large debris disk is similar to the Kuiper Belt, which encircles the solar system and contains a range of icy bodies from dust grains to objects the size of dwarf planets, such as Pluto.

Hubble astronomer Paul Kalas, of the University of California at Berkeley, and team members proposed in 2005 that the ring was being gravitationally modified by a planet lying between the star and the ring's inner edge.

Circumstantial evidence came from Hubble's confirmation that the ring is offset from the center of the star.



This illustration shows the newly discovered planet, Fomalhaut b, orbiting its sun, Fomalhaut. A structure comprised mostly of brown and gold colors surrounds Fomalhaut b. This structure is a Saturn-like ring that astronomers say may encircle the planet. Fomalhaut also is surrounded by a ring of material. The edge of this vast disk is shown in the background as the curving cloud-like feature that appears to intersect the 200-million-year-old star. Fomalhaut b lies 1.8 billion miles inside the disk's inner edge. The planet completes an orbit around Fomalhaut every 872 years.

The sharp inner edge of the ring is also consistent with the presence of a planet that gravitationally "shepherds" ring particles. Independent researchers have subsequently reached similar conclusions.

Now, Hubble has actually photographed a point source of light lying 1.8 billion miles inside the ring's inner edge. The results are being reported in the November 14 issue of Science magazine.

"Our Hubble observations were incredibly demanding. Fomalhaut b is 1 billion times fainter than the star. We began this program in 2001, and our persistence finally paid off," Kalas says.

"Fomalhaut is the gift that keeps on giving. Following the unexpected

see "Fomalhaut" on page 14

Good Tidings

President's Message

Well, another year has come and gone and what a year it was! As usual, we had a full slate of speakers (when the weather cooperated) and even more amazing discoveries in the universe too, from confirmed water on Mars, to actually photographing planets (up to 3) orbiting another star. We are not alone! What was your favourite event of 2008? Why not tell us about it in the January issue of *The Reflector*. A few members like me have been telling you throughout the year about our many favourite moments and experiences. We would like to hear from more of you in future issues. One of my most favourite is in this issue of *The Reflector* (I now have proof that I visited the grave site of my astronomical hero, Mikolaj Kopernik [Nicholas Copernicus]).

Better yet, there is a big year to come with 2009 being the International Year of Astronomy! What do you plan to do for your contribution for sharing some Galileo Moments with the public? Help us celebrate and share this exciting opportunity, in educating the public about the joys of astronomy. Ask yourself why or how you got interested? Merry Christmas and have a happy and safe New Year!

Keep looking up,
Rick Stankiewicz, President PAA

What a year

Editor's Message

Although there were few naked eye visual treats in 2008, notably a reasonably good Perseid shower, the universe was not without excitement. We learned in November that two different groups of astronomers announced they had photographed extrasolar planets. Canadian reseachers led by Christian Marois at the National Research Council's Herzog Institute for Astrophysics photographed a three-planet system around the star HR 8799. They used the Gemini North and Keck telescopes. Meanwhile a team led by Paul Kalas at the University of California Berkelely used the Hubble Space Telescope to photograph a planet around the star Fomalhaut (see cover article in this issue). It seems it's just a matter of time before more photographs of extrasolar planets becomes commonplace.

In this issue John Crossen gives us some great suggestions for picking that perfect holiday gift for the astronomer in your life. He also highlights some conjuctions and meteor showers for the month. Speaking of conjuctions, Rick Stankiewicz explains conjuctions for us with his description of a lunar/Pleiades event from earlier this year. World traveller John Galle reports back from another stargazing trip: this time from Louisana. We have two reviews courtesy of Mark Cody and Dean Shewring. Mark submitted a write up about his round table tracking platform. Dean reviews the Sega Toys Homestar Planetarium.

Enjoy this month's issue and see you in the new year.

Phillip Chee
Editor, The Reflector

Peterborough Astronomical Association

The Reflector is a publication of the Peterborough Astronomical Association (PAA). Founded in 1970, the PAA is your local group for astronomy in Peterborough and the Kawarthas.

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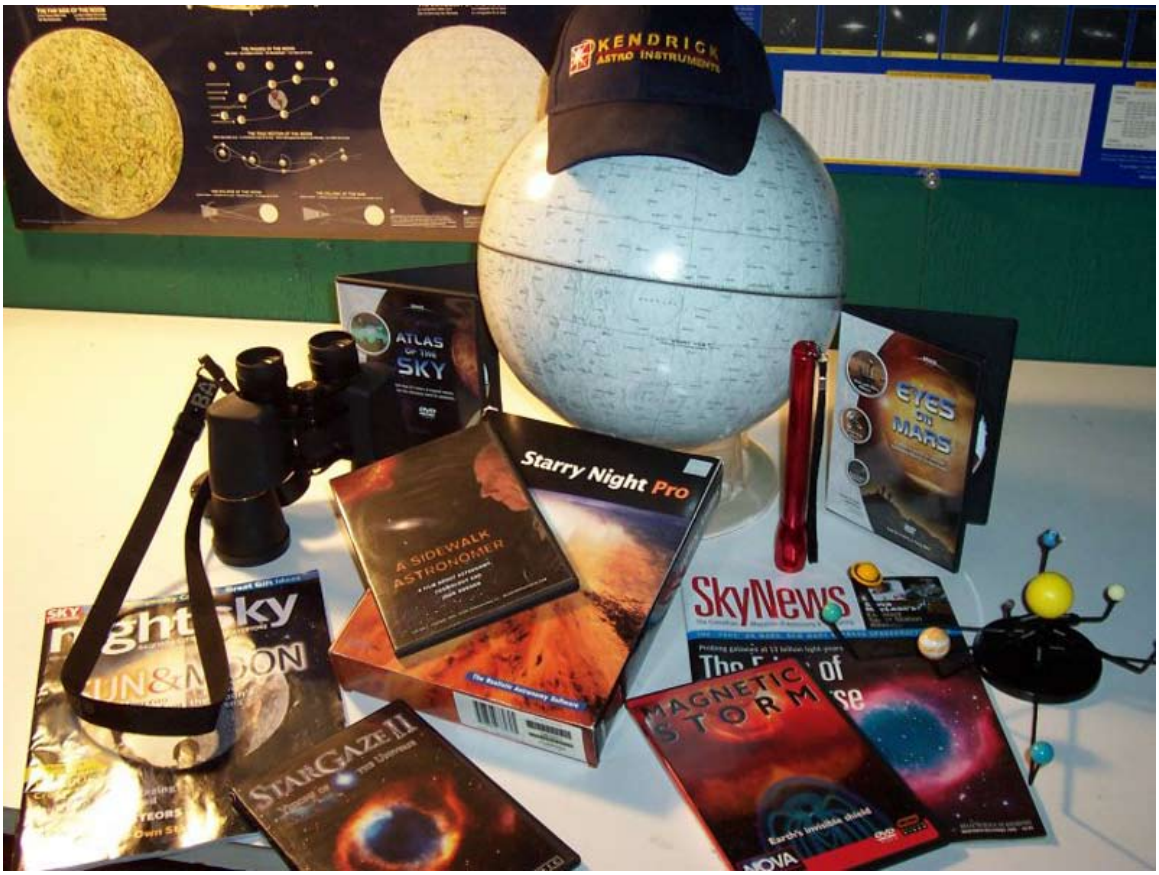
Astronomical gifts without an astronomical price



Gift Collection. Just a few inexpensive things the beginning astronomer can use.

There are a number of gifts you can give the beginning astronomer that have a very down-to-earth price and best of all, some are available in just about any store.

Items like a warm hat with earmuffs, winter-warm socks, boot warmers, hand warmers, Long Johns and thick fleece wear are all much-appreciated by anyone who is stargazing on a nippy winter's night. They're available at sporting goods shops and any big box store. Here are a couple of hints on what does and doesn't work.

Avoid any gear that is designed for high-energy outdoor activities. It breathes to let moisture out. Unfortunately, the body doesn't generate much moisture stargazing, so an old fashioned heavy winter coat that blocks the wind is a better choice.

Also, mittens are more efficient than gloves. My wife bought me a pair of mittens that flip open so that I can work the controls of my telescope or binoculars with my bare fingers then pop the mitten portion back over them for warmth. Gloves can be thick and awkward when fiddling with tiny control knobs. These mittens work for me.

As far as astronomy gear goes, here are some great ideas for the first timer. Everything is available from an astronomy store, and you can Google them up in a jiffy by typing in **`ontario astronomy stores`** and hitting search.

For starting out I recommend Terence Dickenson's *NightWatch* as one of the best books going. At $34.95 it has it all from explaining the Big Bang, star birth and how the planets formed, to star charts of the constellations, the latest information on our solar system and how to choose a telescope when the time for using one comes.

A planisphere is another great choice. It

see "Gifts" on page 16

Conjunctions, occultations and meteors in December

Full Moon. Astronomers curse the Full Moon because it lacks detail and washes out the night sky. But this is a great phase for exploring meteor impact trails like the ones from Crater Tycho (lower left of centre). Photo by NASA.

In addition to the Christmas rush during the day, December's night sky will be a busy place, too. So take a break, bundle up and look up. There's a lot to see.

December 5th brings the First Quarter Moon phase. Often called the Half Moon, this is an ideal time to break out the binoculars and have a look at the craters along the line separating the lit from the unlit portions. Called the terminator, the shadows accent the crater shapes and the mountains so that they stand out dramatically.

On December 11th you can witness an occultation, but not of the spooky type. An occultation is when the Moon, or an asteroid pass between us and a distant star. Think of Moon eclipsing a star instead of our Sun and you've got the idea.

From our point of view in Canada this occultation will have the Moon passing in front of the Seven Sisters of the Pleiades in the pre-dawn sky. It's a binocular event, so bundle up, and enjoy a look—along with a hot cup of coffee.

A day later, on December 12th we will have a full Moon. Normally I suggest that you stay inside and snuggle up with the tube. But, again, if you're a binocular owner, the Full Moon presents some interesting views during this phase. So instead of looking for craters and shadow-accented details, you're looking at the Moon lit face on.

The first detail to look for is the contrast between the dark areas (the lowlands) and the brighter areas (the highlands). Early astronomers assumed that the Moon's surface was just like Earth's. So the big flat areas were thought to be seas or maria in Latin. Actually they are huge lava flows from massive meteor impacts that occurred about 2 billion years ago. The lighter areas are mountain ranges a.k.a. the highlands.

However, there are some bright streaks that are also visible. Most prominent is a series of streaks that radiate outwards from the crater Tycho. Tycho looks like the bellybutton on a navel orange and is in the lower hemisphere of the Moon. The streaks were created during a meteor impact which threw long debris trails out and across the Moon's surface. The fresher material is lighter than the surrounding undisturbed material.

The Geminid Meteor Shower on December 13th will most likely be washed out by the Gibbous Waning Moon's glow. Hearty individual can bundle up and hope for a couple of "big ones" that will cut through the lunar light pollution. The constellation Gemini is the direction from which the meteors will appear to come from. Check out the November/December issue of *SkyNews Magazine* for a good star chart.

Winter officially begins at 7:04 am on December 21st. And on December 26th there is a nifty conjunction of Venus and Neptune in the Western sky at sunset. If you're still "turkeyed out" and snoring in your Laze Boy with the newspaper draped over your face like a pup tent, wake up. This will be a nifty little binocular conjunction. Venus will be as bright as an aircraft landing light, but Neptune will be a tiny blue dot visible only in your binocs. Maybe this will be a chance to use that new pair Santa dropped off!

John Crossen

Homestar: A Unique Plantetarium Experience

I've been looking for a replacement for that beloved, if rather inadequate, toy planetarium from my youth for quite a long time. I was looking for something that would provide a reasonable substitute for the night sky on those many many clouded evenings so familiar to Peterburians. A home planetarium for me is an oasis of wonder in a desert of wet, mosquitoed or frozen outdoor nights and yet should offer more than the miniscule vistas of an impersonal computer screen.

The closest I've found to my ideal is the Homestar Planetarium from Sega. First unleashed in Japan in 2006 to fill that niche market of frustrated masses huddled in their apartments under polluted urban skies, the Homestar has recently lept across the Pacific and is now available for us North Americanites.

A Homestar could be useful to the Peterborough Astronomical Association for very small group presentations on the northern night sky. All you need a small or medium sized room that can be darkened,

see "Planetarium" on page 13

Moon Phases

First Quarter	4:26 pm	December 5
Full Moon	11:37 am	December 12
Last Quarter	5:29 am	December 19
New Moon	7:22 am	December 27

The Sky this Month

Mercury is at superior conjunction on the 25th. By mid-month it will be an evening star at twilight. Passes 1.3° south of Jupiter on the 30th.

Venus brightens to magnitude –4.4 and is prominent in the evening sky. On December 1st it is 2° south of Jupiter and rapidly passes it and by the 5th is 5° away.

Mars is in conjunction with the sun on December 5th and is not visible while in the sun's glare.

Jupiter continues to display in the evening sky and will join Venus, Mercury and the Moon in a number of conjunctions during the month. By month's end it will set before the end of twilight.

Saturn in Leo rises at midnight by mid-month and transits as high as 50° near morning astronomical twilight.

Moon in conjunction with Venus and Jupiter on December 1st. On the morning of the 11th it is 0.7° north of the Pleiades and 1.4° south of the Beehive Cluster on the 15th. Full moon on the 12th will be the largest of the year.

Meteor showers Geminids peak on the 13th at 6pm and the Ursids peak on the 22nd around 3am.

Solstice arrives on the 21st at 7:04am.

Stargazing in Acadiana

Star gazing in November in Ontario can be a rather frustrating and uncomfortable experience. An alternate, if you happen to have a week or so of free time, is Acadiana. This is the home of the Cajun people in south-west Louisiana. At this time of year you can star gaze in comfort, with fabulous clear skies, no humidity, temperatures in the 70's during the day, and 40's and 50's overnight, and really nice surroundings.

One concern I did have before venturing to this area is the possibility of hurricanes. It seems to me that they wouldn't be much fun in a small camper in an area where the sea is just the other side of a levee. However, upon investigation I discovered that the hurricane season actually moves from west to east around the Gulf of Mexico as the season progresses, and consequently the probability of one occurring in west Louisiana in November is statistically remote (but I've have noticed that statistics can be iffy, so we stayed tuned to the NOAA weather radio network at all times).

Acadiana is relatively unknown to outsiders. The area covers the bayous and swamps of the Atchafalaya drainage basin, and was settled by Acadians from the Maritime provinces that was deported in the 1750's. The area remained extremely isolated until the advent of the US Interstate highway, and even today is considered a "modern world" backwater. Although it has lots of oil and gas wells, the area is primarily agricultural. The vast majority of people are of French descent, and just about everyone over the age of 50 still speaks the language, plus many younger persons.

I have star gazed at two local state parks, Chicot near the town of Ville Platte, and Lake Fause, right in the swamps near St Martinville.

Chicot State Park is very large, with a variety of daytime activities including biking on paved roads and trails, many miles of hiking, and fantastic kayaking and canoeing in the cypress swamps. During the week the park is very quiet so you can star gaze right from your

see "Stargazing" on page 15

Have You Seen Copernicus Lately?

Nicholas Copernicus (Mikolaj Kopernik) died on 24 May 1543, in Frombork, in the Warmia Province of Poland. Legend says that the first printed copy of the now famous *De revolutionibus orbium ceolestium* (*On the Revolutions of the Heavenly Spheres*) was placed in Copernicus' hands on the day he died, allowing him a farewell to his *opus vitae* (Latin for: life's work). Known as the "Father of Modern Astronomy", Copernicus became famous for having proven the heliocentric universe, so he effectively put the Earth in motion around the Sun.

Copernicus was reportedly buried in the Arch Cathedral of Frombork where archeologists had long searched for his remains. In August 2005, a team of archeologists led by Jerzy Gąssowski, discovered what they believed to be Copernicus's grave and remains, after scanning beneath the floor of the cathedral. The find came after a year of searching, and the discovery was announced only after further research, on November 3, 2008. Gąssowski said he was "almost 100 percent sure it is Copernicus". A forensic expert of the Central Forensic Laboratory of the Polish Police used the skull to reconstruct a face that closely resembled the features — including a broken nose and a scar above the left eye — on a Copernicus self-portrait. The expert also determined that the skull belonged to a man who had died around age 70 — Copernicus' age at the time of his death. The grave was in poor condition, and not all the remains of its skeleton was found. For instance, the skeleton was missing its lower jaw. The DNA from the bones found in the grave matched two sample hairs taken from a book owned by Copernicus, found in the library of the University of Uppsala in Sweden. The Swedes raided and pillaged Poland over the centuries, so it is no surprise that books that had belonged to Copernicus would end up there.

On November 20, 2008, reports were released that confirmation had been made that the skull found was indeed the skull of Copernicus. A portrait, based on the skull's structure, of what Copernicus might have looked like have been released as well. Universe Today's website (http://www.universetoday.com) carries a picture of what Copericus was to have looked like when he died (see Nov. 20th).

It so happens that my wife and parents and I were at this same famous Arch Cathedral at Frombork in the fall of 2007, as we toured Poland. This quaint town is nestled in the northeast of the country overlooking the Baltic coast and a short distance from the Russian border. The first image shows the beautifully reconstructed cathedral (damaged during WW II) from the vantage point of the Clock (Belfray) Tower. It was worth the 227 step climb. In the distance you can see into Russia near Kalingrad. This was one of the highlights of my trip to Poland and to think that we likely stood on top of where Copernicus was buried is still a thrill for me. The second image shows the epitaph to Copernicus on a pillar in the cathedral. The latin inscription reads, "To Nicholas Copernicus of Torun, once a canonists of the Church of Warmia, the most famous astronomer, whose name and accomplishments are known across the world, this commemorating plate of fraternal love and respect was laid by prelates and canonists of the entire Warmia Chapter." Underneath this plate is a 1946 commemorating ribbon with a stylized bronze palm branch that reads, "To Nicholas Copernicus, on the first anniversary of regaining of Warmia. May 1946, The Government of the Republic of Poland."

see "Copernicus" on page 11

What is an Occultation?

I remember the first time I heard reference to an occultation and I thought of some mysterious event that did not have anything to do with astronomy, but more to do with astrology. However, names can be misleading. The "occult" is often referring to things that involve the supernatural or something mystical or magical, but in astronomy, "to occult" is when one larger celestial body conceals or covers a smaller one. This is typically when an object appears to move in front of another object and hide it from view. Over

the last couple years there have been many opportunities to witness the Moon passing in front of more distant background objects like the large open star cluster of the Pleiades (M45). From your vantage point on Earth, the Moon causes the stars in a cluster like the Pleiades to appear and disappear as it moves across your field of view. It is an amazing event to witness and with nothing more than binoculars you can see the whole show from wherever there are clear skies. The catch is that you need more than clear skies. The stars and Moon must be aligned for your vantage point on the earth for starters and then the trick with the Moon is not to have it in too bright a phase or "washout" of the stars will occur. I have been monitoring the opportunities for an occultation over the last year through *SkyNews Magazine,* but typically the lunar phase at the time of occultation was a brighter gibbous phase and for my astrophotography purposes this was just too bright and not near as dramatic as I required. Finally, on June 30th, 2008, the conditions were right. From across southern Ontario a thin waning crescent Moon was scheduled to pass right through the middle of the famous star cluster of the Pleiades. This did mean getting up well before dawn, but it was worth the lack of sleep that night. The attached images show a sample of the fruits of my labour.

I used a tripod mounted Canon 400D (Xti) camera and Sigma 70 to 300mm lens combination, set at about 190mm, f/5 and ISO 800 and 1600 for an exposure of 4/5 seconds.

The first image shows the well-lit "earthshine" side of the Moon with the alpha star "Alcyone" (magnitude 2.9, at 240 ly), just re-appearing from the lower right limb of the Moon. The Moon by this point had already passed over the stars to the upper right. If you look closely, you will notice that 5th magnitude star, "Pleione" (at 95 ly) is just about ready to be covered by the bright lunar crescent at the very bottom limb of the Moon, as "Atlas" (3.6 mag., at 290 ly) is just missed by the Moon, as it lay just that much further below the lunar disc.

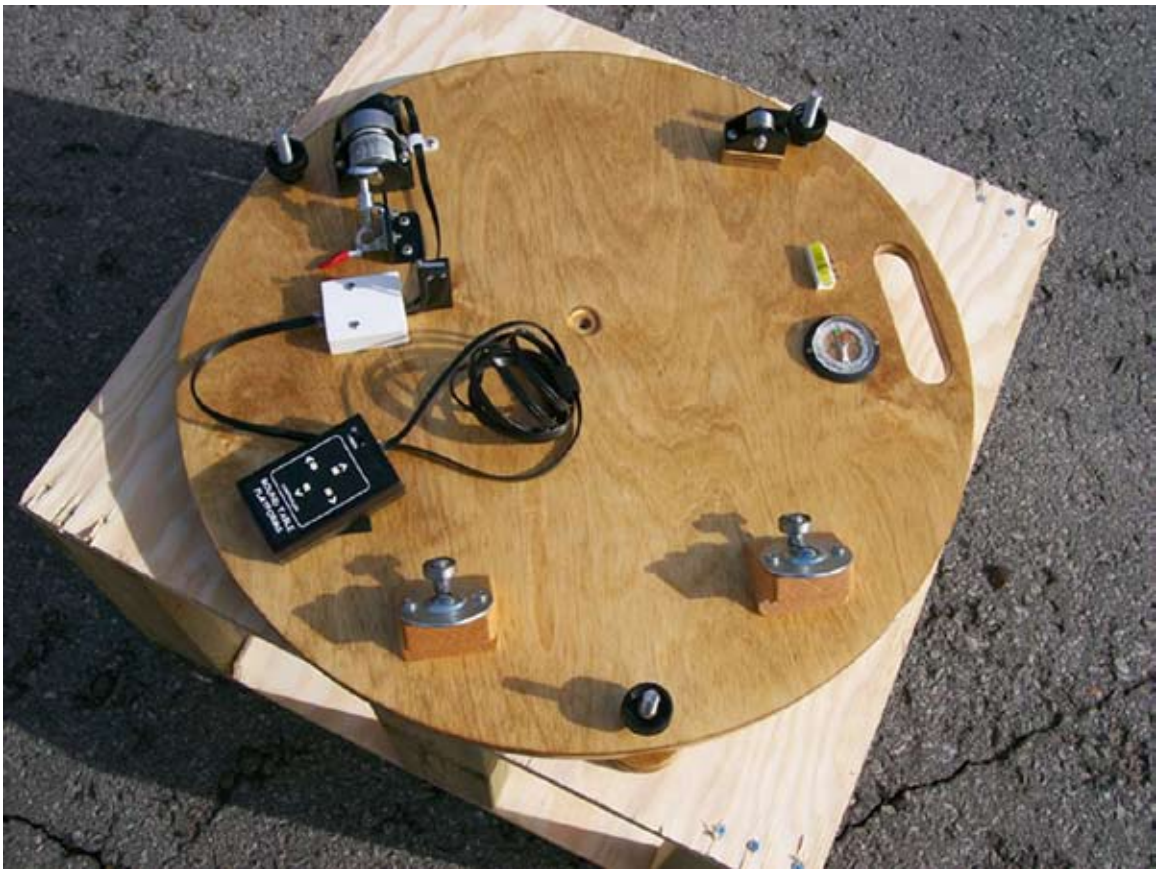
The second image clearly shows the increased distance between the Moon and Alcyone while Pleione is nowhere to be seen because it is still being occulted and Atlas is completely unscathed by the event. The time between these two images is about 19 minutes.

see "Occultations" on page 15

PHOTO GALLERY

***Orion*. On November 20 I created this portrait of the constellation Orion by stacking three 5-minute exposures made with a Nikon D200 and Nikkor 50mm f/1.4 AI lens. What really helped was the use of a IDAS LPS-P2 light suppression filter newly purchased from Hutech. Photo by Phillip Chee**

Round Table Platforms



The Round Table Platform with the top plate removed showing the controller, compass, rollers, and level.

Dobsonian telescopes are known to be the best scope available for the money – great for both beginners and experienced amateur astronomers alike – and the scope of choice for public outreach. Their main drawback, however, is their inability to track an object. This can be quite frustrating when viewing at high power and the scope has to be constantly re-centred on an object.

The simplest solution is to use an equatorial platform. This is a kind of astronomical "Lazy Susan" that the Dob sits on and will track the heavens in right ascension (east to west) for up to 75 minutes. The rotating platform is set to the user's latitude, powered by a 9 volt battery, and rolls on a curved track in step with the rate of earth's rotation.

With the cost for some starting at $1300 US and more, I searched the internet and came across Brian Reed's "Round Table Platforms" who makes four, nicely finished, models at reasonable prices from a suburb of Chicago. The basic model, which I purchased, is 23 inches in diameter and will handle Dobs up to 12.5 inches in aperature and cost $ 615 US plus shipping. The other three models are for Dobs up to 20 inches in aperature and an especially designed one for the Mag-1 Portaball. As for shipping costs, Brian ships via USPS which means there are no hassles at the border – no courier broker fees – and Canada Customs will only hit you up for the GST and PST applicable on the purchase price. Brian accepts Paypal but you must add 4% to offset credit card fees.

Once payment is received, Brian will have your hand-crafted platform ready to ship in about eight weeks whereupon he will send out an e-mail along with a pdf of the owner's manual to read up beforehand but you will still get a printed version with the finished product.

see "Round Tables" on page 15

The Universe in 45 minutes

Members of the Peterborough Astronomical Association were treated to a thought-provoking presentation from Doug Angle of the Kingston Chapter of the Royal Astronomical Society of Canada on November 7th. Doug opened his presentation with a few light comments about dark matter (he doesn't take it too seriously) and then led us on a fascinating exploration of what we see depends on where we are when we see it.

Using examples such as walking and tossing a clay ball Doug demonstrated that what he sees from his point of view (the ball going straight up and down) is very much different from what the audience sees from their seats (the ball arcing up and forward as he walks across the room tossing the ball).

He then proceeded to further tweak our imaginations by commenting that dark matter and dark energy might simply be phenomena we are observing that are both attributable to existing factors which we haven't yet considered. This realization may well result in a Homer Simpson-like "d'oh" sometime in the future.

Also on the agenda was a discussion of time utilizing the example of a supernova going bang and how long it takes for the light to reach our telescope. So when did it happen? Now? Then? Or elsewhere?

This caused more than a few hands to go up followed by a number of questions and comments. My personal favourite had to do with how you don't notice the smell of a dead skunk on the highway until you have passed the point of its demise. Call it olfactory relativity. Well, that brought it all down to a common level!

In short, it was a rousing discussion that left us all with more questions than answers. But isn't that the way it's supposed to be?

The PAA thanks Doug for sharing his time and talents with us. It was a most enjoyable evening and one of the highlights of the club's year.

John Crossen

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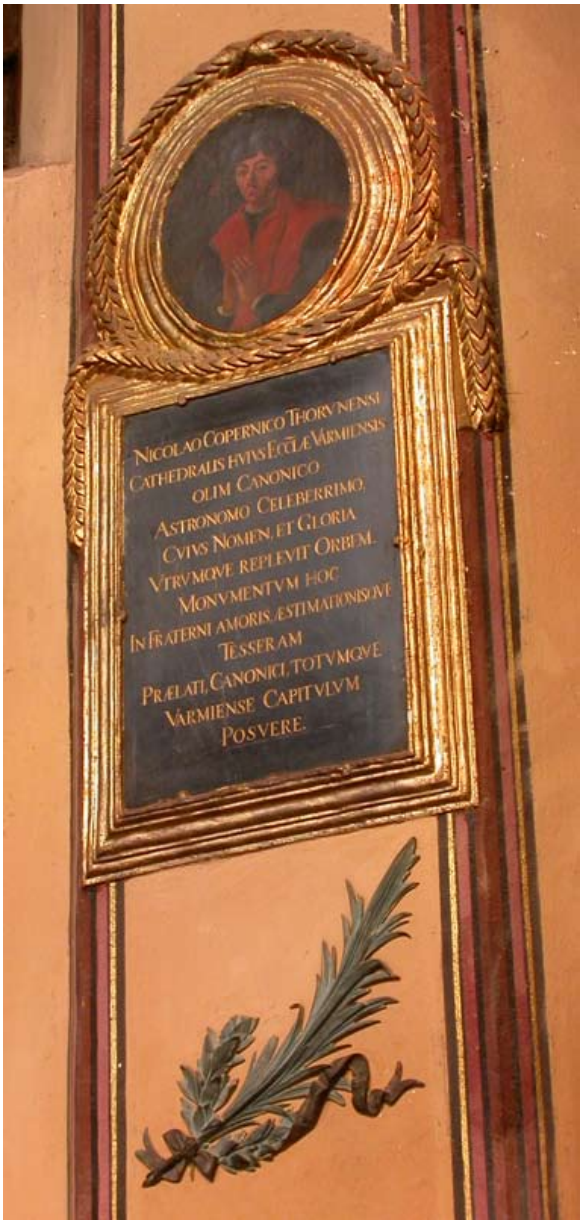
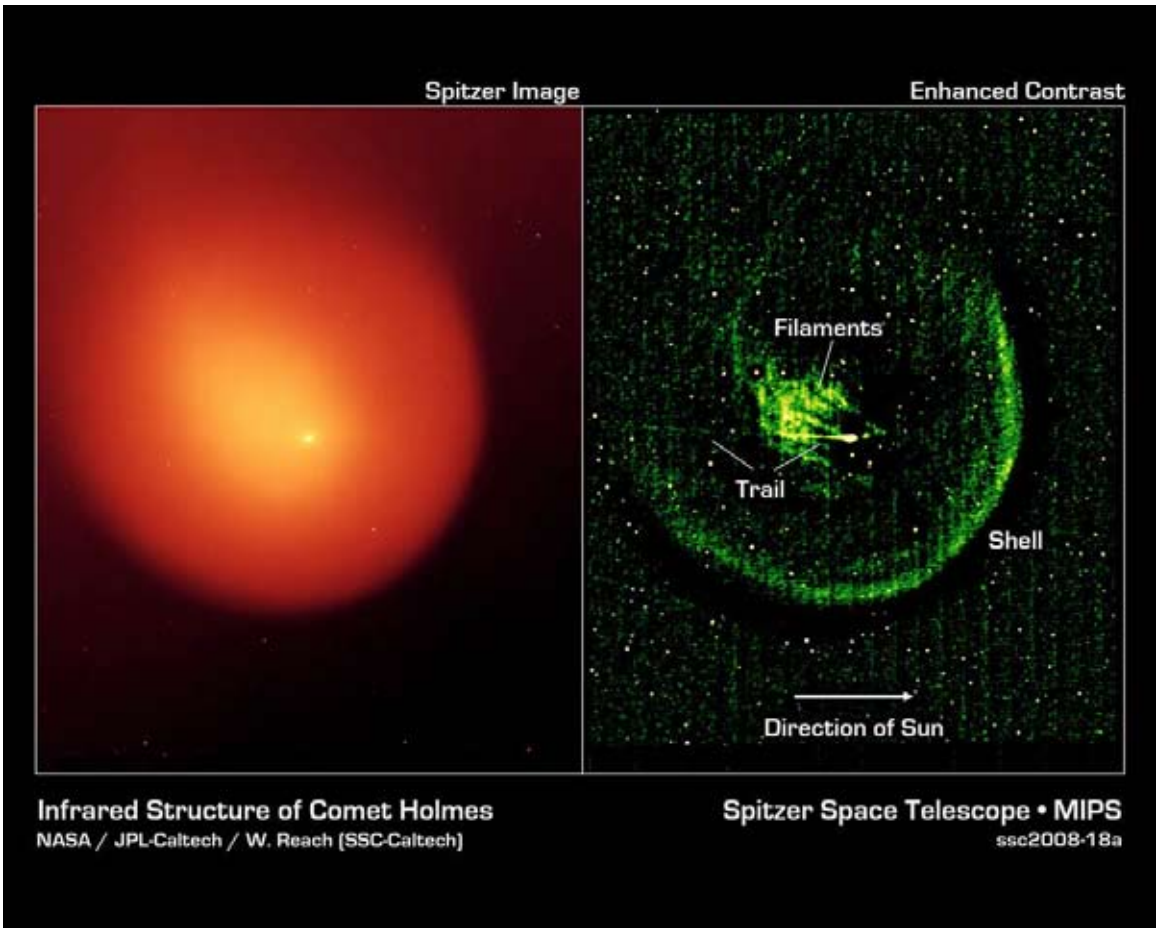
Copernicus



Both travel and science can be powerful tools but never has this been brought home to me more than as a result of this trip. I feel honoured and privleaged to have been able to have travelled to this place and to have science validate what I had hoped was true (Copernicus was buried there) is a real bonus. I hope to continue to share more experiences related to my astronomical discoveries while Poland, but I will have to save these for future issues of *The Reflector*.

A Proud Travelling Polish Astronomer
(Rick Stankiewicz, PAA)

What happened to Comet Holmes?



Comet Holmes as imaged by the multiband imaging photometer (MIPS) on the Spitzer Space Telescope. The enhanced contrast image at the right shows the comet's outer shell and mysterious filaments of dust.

One year after Comet 17P/Holmes shocked onlookers by exploding in the night sky, researchers are beginning to understand what happened.

"We believe that a cavern full of ice, located as much as 100 meters beneath the crust of the comet's nucleus, underwent a change of phase," says Bill Reach of NASA's Spitzer Science Center at the California Institute of Technology. "Amorphous ice turned into crystalline ice" and, in the transition, released enough heat to cause Holmes to blow its top.

Anyone watching the sky in October 2007 will remember how the comet brightened a million-fold to naked-eye visibility. It looked more like a planet than a comet—strangely spherical and utterly lacking a tail. By November 2007, the expanding dust cloud was larger than Jupiter itself, and people were noticing it from brightly-lit cities.

Knowing that infrared telescopes are particularly sensitive to the warm glow of comet dust, Reach and colleague Jeremie Vaubaillon, also of Caltech, applied for observing time on the Spitzer Space Telescope—and they got it. "We used Spitzer to observe Comet Holmes in November and again in February and March 2008," says Reach.

The infrared glow of the expanding dust cloud told the investigators how much mass was involved and how fast the material was moving. "The energy of the blast was about 1014 joules and the total mass was of order 1010 kg." In other words, Holmes exploded like 24 kilotons of TNT and ejected 10 million metric tons of dust and gas into space.

These astonishing numbers are best explained by a subterranean cavern of phase-changing ice, Reach believes. "The mass and energy

see "Comet Holmes" on next page

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Comet Holmes

are in the right ballpark," he says, and it also explains why Comet Holmes is a "repeat exploder."

Another explosion was observed in 1892. It was a lesser blast than the 2007 event, but enough to attract the attention of American astronomer Edwin Holmes, who discovered the comet when it suddenly brightened. Two explosions (1892, 2007) would require two caverns. That's no problem because comets are notoriously porous and lumpy. In fact, there are probably more than two caverns, which would mean Comet Holmes is poised to explode again.

When?

"The astronomer who can answer that question will be famous!" laughs Vaubaillon.

"No one knows what triggered the phase change," says Reach. He speculates that maybe a comet-quake sent seismic waves echoing through the comet's caverns, compressing the ice and changing its form. Or a meteoroid might have penetrated the comet's crust and set events in motion that way. "It's still a mystery."

But not as much as it used to be.

See more Spitzer images of comets and other heavenly objects at www.spitzer.caltech.edu. Kids and grownups can challenge their spatial reasoning powers by solving Spitzer infrared "Slyder" puzzles at http://spaceplace.nasa.gov/en/kids/spitzer/slyder.

Dr. Tony Phillips

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

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Planetarium

with access to an electrical outlet, and with a ceiling around eight feet high. The focus range is given as 6.5 to 7.5 feet – but the unit's focusing range is dependent on how high it's placed off the floor – so it's pretty flexible. A flat, level surface is required, but the unit is so small, even an end table would be large enough to hold it. I've tried it out with a couple of groups of my friends and they were suitably impressed.

The Homestar Planetarium comes with two disks which depict around 10,000 northern sky stars, including a very bright Milky Way. The second disk is the same, but with lines to outline the more popular constellations. The controls are so simple even I can operate it. It has a few remarkable features. First is a diurnal motion switch, which allows the image to rotate in either direction (marked 'N', counterclockwise for the northern sky and 'S', clockwise for the southern sky). It takes about 12 minutes to complete a full rotation. While rotating, you can turn on a 'Shooting Star' ('SS') switch that sends a meteor scooting across the sky about every 30 seconds. You also get a CD with 15 minutes of planetarium-style background music to help with the experience. Then, all you need is a small laser pointer and you're ready to put on a show!

I hope to be able to demonstrate the operation of the Homestar at a future PAA meeting. Our meeting room is a larger than the optimum size for the unit, but it should still be an interesting and informative experience for our membership.

The 'Homestar Optical Star Projection System' (its proper name) is currently available from Efston Science in Toronto for $199.95, plus taxes and shipping.

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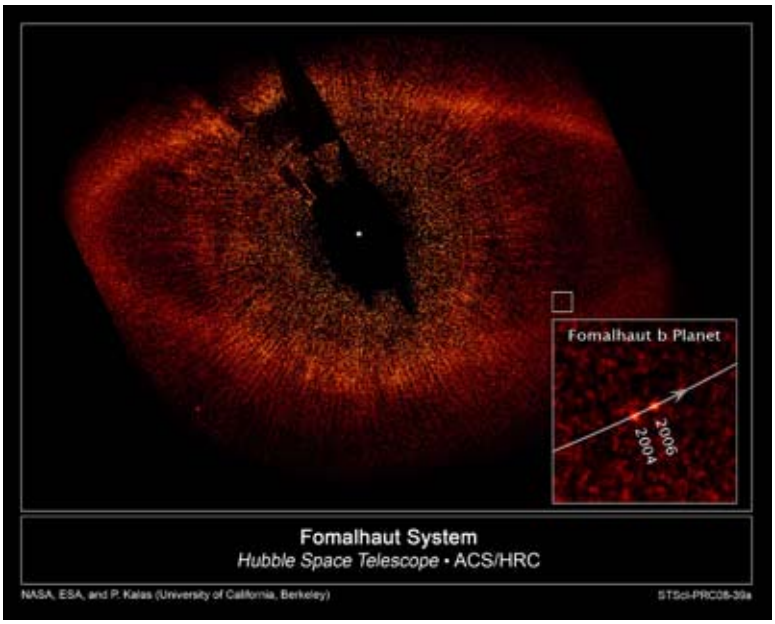
Fomalhaut

discovery of its dust ring, we have now found an exoplanet at a location suggested by analysis of the dust ring's shape. The lesson for exoplanet hunters is 'follow the dust,'" said team member Mark Clampin of NASA's Goddard Space Flight Center in Greenbelt, Md.

Observations taken 21 months apart by Hubble's Advanced Camera for Surveys' coronagraph show that the object is moving along a path around the star, and is therefore gravitationally bound to it. The planet is 10.7 billion miles from the star, or about 10 times the distance of the planet Saturn from our sun.

The planet is brighter than expected for an object of three Jupiter masses. One possibility is that it has a Saturn-like ring of ice and dust reflecting starlight. The ring might eventually coalesce to form moons. The ring's estimated size is comparable to the region around Jupiter and its four largest orbiting satellites.



This image, taken with the Advanced Camera for Surveys aboard NASA's Hubble Space Telescope, shows the newly discovered planet, Fomalhaut b, orbiting its parent star, Fomalhaut.

The small white box at lower right pinpoints the planet's location. Fomalhaut b has carved a path along the inner edge of a vast, dusty debris ring encircling Fomalhaut that is 21.5 billion miles across. Fomalhaut b lies 1.8 billion miles inside the ring's inner edge and orbits 10.7 billion miles from its star.

The inset at bottom right is a composite image showing the planet's position during Hubble observations taken in 2004 and 2006. Astronomers have calculated that Fomalhaut b completes an orbit around its parent star every 872 years.

The white dot in the center of the image marks the star's location. The region around Fomalhaut's location is black because astronomers used the Advanced Camera's coronagraph to block out the star's bright glare so that the dim planet could be seen. Fomalhaut b is 1 billion times fainter than its star. The radial streaks are scattered starlight. The red dot at lower left is a background star.

This false-color image was taken in October 2004 and July 2006.

Kalas and his team first used Hubble to photograph Fomalhaut in 2004, and made the unexpected discovery of its debris disk, which scatters Fomalhaut's starlight. At the time they noted a few bright sources in the image as planet candidates. A follow-up image in 2006 showed that one of the objects is moving through space with Fomalhaut but changed position relative to the ring since the 2004 exposure. The amount of displacement between the two exposures corresponds to an 872-year-long orbit as calculated from Kepler's laws of planetary motion.

Future observations will attempt to see the planet in infrared light and will look for evidence of water vapor clouds in the atmosphere. This would yield clues to the evolution of a comparatively newborn 100-million-year-old planet. Astrometric measurements of the planet's orbit will provide enough precision to yield an accurate mass.

NASA's James Webb Space Telescope, scheduled to launch in 2013 will be able to make coronagraphic observations of Fomalhaut in the near- and mid-infrared. Webb will be able to hunt for other planets in the system and probe the region interior to the dust ring for structures such as an inner asteroid belt. For more information about the Hubble Space Telescope, visit:

http://www.nasa.gov/hubble
http://hubblesite.org/news/2008/39

News release courtesy of NASA

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Stargazing

campsite if you choose a site free of trees. On weekends the two campgrounds fill up and everyone has lights on. However, there are a number of locations within the park that are very dark, with the best being a small picnic area near the waste treatment plant, where there is a full 360 degree view.

Lake Fausse State Park is fairly small, being on an island connected to a levee road by a bridge. Boating is great, and the place is busy all week long with bass fishermen, who say it's one of the best place in Louisiana (I'm not a fisherman, but they do seem to catch an awful lot of fish, and it's no all small stuff either). Star gazing at your campsite would not be very good as there are too many trees. But just next to the campground is a Boy Scout camp area with a large open space which is very dark and has a good view from about 20 degrees up.

A further option, which I have not done so far, is to attend the Deep South Regional Star Gaze at Norwood, La, which is near the Alabama border, about 150 km from Acadiana. This is held around mid-November, and attracts about 100 people. I'm told it's pretty good, and we'll probably attend next year.

See you there!

John Galle

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Occultations

So what is the big deal about an occultation? Well, I think it just boils down to the pure joy of watching celestial objects "wink" in and out of view, as this just doesn't happen every night. For me, it was the challenge of recording it to show you for this article and that is reason enough for me to get excited about an event of this nature.

The next scheduled occultation is December 10-11, when a near full Moon passes right through the Pleiades once again and this should be visible across most of Canada, so….

Keep looking up!
Rick Stankiewicz, President PAA

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Round table

Mark's 8 inch Dobsonian scope atop the Round Table Platform.

Brian's platforms include a bubble level and a compass for proper orienteering to true north. He even estimates where true north will be at your location and marks that on the compass dial. There are three adjustable feet on the bottom for leveling the platform and also for slight adjustments to the latitude – you can use the platform five degrees plus or minus from the set latitude.

The bottom line is that as long as the bottom of the platform is level and truly oriented to true north, objects will stay in the eyepiece for as long as the platform is tracking. This also allows for short term astrophotography – such as planetary photography with a webcam. If an object does drift, then a slight adjustment towards true north is required, or the supplied hand control can be adjusted.

If you've got a Dob and want it to track, I can heartily recommend Brian's products. They look good and work exactly as promised. Check out Brian's website at http://www.roundtableplatforms.com or, for those without internet access, his telephone number is 1-847-202-1986.

Mark Cody

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Gifts

shows the constellations as they will appear overhead at any time of the year. Make sure you buy one for our latitude (40-50 degrees north) and that it is large enough to be read via a red flashlight in the dark.

This brings me to another gotta have and that's the red flashlight. Red is the colour of choice because it doesn't blind dark-adapted eyes like white light does. My recommendation is to choose one with energy-conserving LED lighting.

Magazine subscriptions are also another great gift. Canada's *SkyNews* is a perfect choice for the beginner. It is written with a straightforward, easy-to-understand style and has an excellent star chart in each bi-monthly issue. Other good choices include *Astronomy Magazine* and *Sky & Telescope* magazines. Both are beyond the reading range of children and can be a bit of a slog for even the beginning adult astronomer.

Membership in an astronomy club (www.peterboroughastronomy.com) is a good choice for the astro-interested person in this area.

Also on my list is a pair of 7x50 (7 power by 50mm aperture) binoculars. They're great for spotting bright star clusters by night and sports events by day. Avoid 10x50 binocs as the extra power makes the images shake too much when hand held.

If you can visit one of the stores in person, you'll find a host of other things like astronomy software, eyepieces, posters, books for cloudy nights and much more. Until we meet again by the backyard telescope, have a "Jolly Holly" and clear skies to all.

John Crossen

THE UNIVERSE
YOURS TO DISCOVER

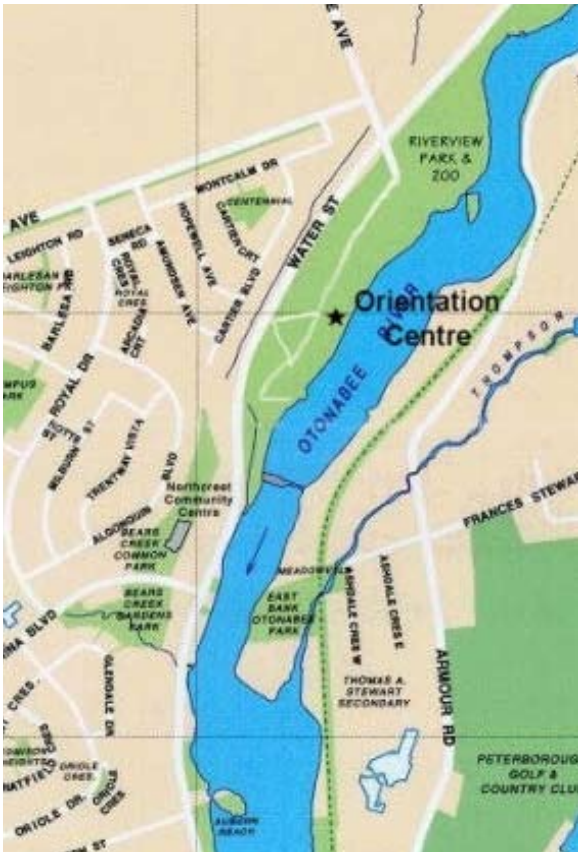
INTERNATIONAL YEAR OF
ASTRONOMY
2009

Articles

Submissions for *The Reflector* must be received by the date listed below. E-mail submissions are preferred (Microsoft Word, OpenDoc, ASCII and most common graphic formats are acceptable). Typed or hand-written submissions are acceptable provided they are legible (and not too long.) Copyrighted materials will not be published without written permission from the copyright holder. Submissions may be edited for grammar, brevity, or clarity. Submissions will be published at the editor's sole discretion. Depending on the volume of submissions, some articles may be published at a later date. Please submit any articles, thoughts, or ideas to:

Phillip Chee
445 Park Street North
Peterborough, ON K9H 4R1
phillip.chee@gmail.com

Next submission deadline:
December 21, 2008



Meetings The Peterborough Astronomical Association meets every first Friday of most months at the **Peterborough Zoo Orientation Centre** (Next to the PUC Water Treatment Plant) at 8PM. PAA executive business will be conducted starting at 7:30PM. Members and the public are welcome to attend the earlier time.