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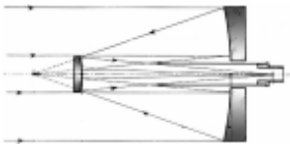
PETERBOROUGH ASTRONOMICAL ASSOCIATION

THE REFLECTOR



Volume 6, Issue 7 September 2007

Editorial

From the launching of new space probes to rumors of drunken astronauts, this past summer has been anything but uneventful! Just to catch you up on some of the stories you might have missed, here's a quick recap:

- **July 12** - The first conclusive evidence of water vapor has been discovered in the atmosphere of an extrasolar planet. This water, however, would be very hot because the planet is larger than Jupiter and orbits its star in 2.2 days!
- **July 26** - Rumors start surfacing of drunk astronauts allowed to fly.
- **August 4** - NASA's Mars Phoenix Lander blasted off and will reach the planet in May 2008. Once it lands in the Martian polar regions, it will stay stationary as it searches for life under the surface.
- **August 9** - The space shuttle Endeavour launched on schedule to the ISS, where it transferred food, water, air, experiments,… along with a starboard truss section that was bolted to the station's backbone, enhancing its size and capability.
- **August 17** - Robert Bigelow speeds up plans for an orbital space hotel. The habitable Sundancer module could be launching as soon as 2010.
- **August 29** - NASA safety release is certain there were no drunk astronauts.
- **August 31** - Mars rovers hit the road again after being threatened by dust storms (see pg. 4 in this issue).

Artist's concept of the young solar system with enough water to fill our oceans 5 times! Image credit: NASA/JPL-Caltech

Water Vapor Detected By Spitzer

The Spitzer Space Telescope has found enough water to fill our oceans five times in a newly forming star system. This observation gives us a direct look at how water makes its way to planets.

The star system is called NGC 1333-IRAS 4B and is located about 1,000 light-years away in the constellation Perseus. Within this system is a central star that is still feeding off the material collapsing around it. Spitzer has detected ice falling toward the forming star and vaporizing as it hits the disk of material around it.

For more information, check out these sites:
http://www.spitzer.caltech.edu/spitzer
http://www.nasa.gov/spitzer.
http://planetquest.jpl.nasa.gov.

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Inside This Issue

Domed Observatory Is Made And Priced For Amateurs

Somewhere deep in the heart of every astronomy buff there's a secret wish to have his or her domed observatory. It has to be domed because that's what the big people have. You know, the pros, the chief kahunnas, the lucky folks who get paid to look at the stars. Now there's an affordable domed observatory that makes us astro-pretenders just like the hotshots – well, maybe a tad or ten smaller.

It's called the Personal Observatory Dome or POD for short. Mine arrived last Friday and by the following Monday it was up and had logged one observing session.

POD is the brainchild of Wayne Parker. Wayne is bass guitarist with the band Glass Tiger, but he's also an astronomy buff. Wayne recognized the need for an affordable home observatory for serious amateurs. But it had to be domed, 'cause that's our secret little dream. After three years of designing, testing, and finally getting into production, this particular POD made its debut at Buckhorn Observatory.

The entire unit is made from molded polyethylene plastic that's UV resistant and double walled for strength and rigidity. It's made by SPI Industries, the same company that makes outdoor play ground sets, so you know it's tough. And it assembles quicker 'n slicker than a bicycle on Christmas Eve. Just be sure you watch the "how-to" DVD.

Because the POD bolts together you can also take it apart and transport it quickly to another location – like up to the cottage away from city light pollution. And when you're done at your dark-sky location, you just pack it up and head for home.

This POD will be a permanent fixture, so it's lag-bolted to the deck. Inside lurks "the Yard Cannon," a six-inch Celestron six-inch refractor that is modified for planetary and lunar observing. All this rides on a computerized mount that knows the night sky better than I do. I just push buttons and peep. My POD also has a bay built into the wall with a sliding shelf for a laptop and chair to fit neatly out of the way when not in use.

If the "sheltered" approach to observing tickles your fancy, you'll be pleased to know that POD is available in a variety of colours (some even glow in the dark), has a lockable door and dome, and can be ordered with up to five bays. If you like, drop over to BHO and check mine out. Or visit www.skyshedpod.com for all the details. My POD cost about $1,500 taxes included. Pick yours up and you can skip the delivery charge.

There you have it, a domed observatory, designed and made in Canada that costs about $1,000 less than anything else on the market.

Wayne Parker's first success was as the bass player in Glass Tiger. But if the POD is any indication of what's to come, his next big splash will be with a group called Plastic Dome. To Wayne and the POD Squad, go my thanks for a great product.

John Crossen
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Happy as two peas in a POD. The Personal Observatory Dome will supplement BHO's main roll-off roof unit. POD was dreamed up, designed and made in Canada. Now they're popping up 'round the world.

Killers From Space, It's Not A Movie Anymore

The killers are called Near Earth Objects (NEO) and some come frighteningly close. They are asteroids and comets. The known ones that are dangerously close to us now exceed 4,700. Of that total, 700 are large enough to cause massive extinction events wiping out entire countries. A few could spell the end of the Human Race. The ancestors of these killers have slammed into Earth in the past, and they're going to do it again.

In 1908 a comet plummeted into Earth's atmosphere. The atmospheric

Continued...

Barringer Meteorite Crater in Arizona is a warning about what happens when planet Earth and meteors collide. The results are devastating. Even if it hits in an ocean, the resulting tsunami would kill hundreds of thousands.
Photo: Arizona Department of Tourism

friction and heat caused the huge ball of ice and dirt to explode above a remote area of Siberia called Tunguska. Now known as the Tunguska Event, the blast leveled several hundred square miles of forest land. Had the comet entered our atmosphere just two hours earlier the city of Manhattan would have been pointed towards the incoming killer. The city, all its inhabitants, and everything around it would have been wiped out with a force equal to a hundred nuclear bombs.

Our newest threat comes from an asteroid known as Apophis. In 2029 it will come closer to Earth than some of the weather satellites currently in orbit. If our Sun's gravitational tug alters the asteroid's orbital path even slightly, the massive object (300 meters in diameter) could be nudged into a deadly collision course with Earth on its next pass in 2039. If that happens, we will be subjected to an impact equal to an object the size of Sky Dome (Now Rogers Centre). And while size does matter, the speed of the impact will be stunning. The massive meteor will pass through Earth's 50-km thick atmosphere in less than a second. It won't burn up. It's far too big for that.

When an object that size traveling at that velocity slams into the Earth, the force of the impact will liquefy everything at ground zero. It will send a wall of fire racing outward in all directions. The flaming ejecta will start fires hundreds of miles away. The material that it blasts up into our atmosphere could blot out the Sun for months. And you know what? It's happened plenty of times before.

The Chicxulub Crater was created 65 millions of years ago when just such an event happened in the Yucatan Peninsula. The devastation was global and when the dust settled, the dinosaurs were no longer.

More recently (about 500,000 years ago) a meteor bore into the Earth in Arizona. It created the 570-foot deep, 1.6 km-wide Barringer Meteorite Crater (also known as Meteor Crater). In doing so it also destroyed any life forms within a 1,100 km radius. Threats like this don't come on a regular basis, that's for sure. But when they do, we'd better take notice. For more information and to help, visit NEO.planetary.org.

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A Woman's Place Is In The Home – 350 km Out In Space

Home in this case is the International Space station (ISS). Women account for 17 of the current 94 US astronaut tally and they're making some noteworthy accomplishments.

On Saturday, June 16th, 2007 astronaut Sunita "Suni" Williams became the first woman to surpass Shannon Lucid's record of 188 days in space. Shannon established the previous record on the now-defunct Russian space station, Mir.

Suni set her record aboard the International Space Station. According to Williams, "even when the ISS has problems, it is still a beautiful place to live."

In October of this year, US astronaut Peggy Whitson will become the first woman to command the space station. And later in October she will be joined by Air Force Col. Pam Melroy who will be the second woman to command a space shuttle mission. This will mark the first time that two female commanders have orbited the Earth as a team.

According to Shannon Lucid, the reason there aren't more women in the astronaut program is the fact that women didn't start entering military academies until the late 1970s and are now reaching the experience level to become an astronaut, Williams is 41.

At Mission Control things are a little different. About a third of NASA's 33 Flight Directors are women. A Flight Director has responsibility for running a space shuttle mission - and that's no small task. NASA announced its first female Flight Director in 1985. Today all three Flight Directors who worked this summer's Atlantis Space Shuttle mission are women – including the Lead Flight Director. Here are some more records set by both women and men since we entered the Space Age.

Continued...

Julie Payette flew on Space Shuttle Discovery on May 27 1999. The crew performed the first manual docking of the Shuttle to the International Space Station (ISS). Ms. Payette served as a mission specialist and operated the Canadarm while in orbit. Ms. Payette was the first Canadian to participate in an ISS assembly mission and to board the Space Station. Photo courtesy of NASA.

The first woman in space was Russian Cosmonaut Valentina Tereshkova who entered space and the history books aboard the Vostok 6 on June 16th of 1963. The first man into space was Cosmonaut Uri Gargarin in 1961. Gargarin accomplished the first orbit of Earth in a Vostok spacecraft.

The first Canadian in space was Marc Garneau who flew aboard the US space shuttle in 1984 and made two shuttle missions after that. Canada's First Lady of Space is Roberta Bondar who traveled where no Canadian woman had gone before aboard the Discovery Space Shuttle in 1992. Dr Bondar is a trained physician, an astronaut, a scientist and an accomplished photographer. In addition to her many other accomplishments, she is currently the Chancellor of Trent University.

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Massive Martian Dust Storm Shuts Down Mars Rovers

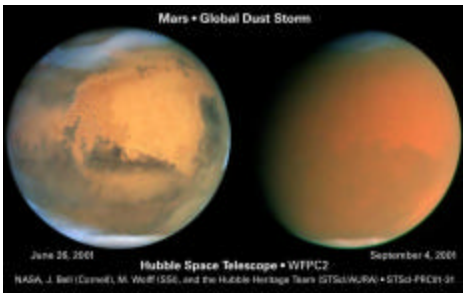
We've been incredibly lucky with the two Mars Rovers, Opportunity and Spirit. Both were originally designed for a 90 Sol mission. A Sol is the name for a Marian day. At 24hours and 39 minutes, it is just 3% longer than an Earth Day. Now, more than three years later both Rovers are still operational and making daily explorations - up until June 27th, at least. That's when a dust storm began encircling the planet.

The dust storm had reduced Mars to little more than an orange blob in backyard telescopes. Even the cameras on the craft orbiting Mars could see little at optical wavelengths through the dense blanket of dust. The solar panels that re-energize the rovers' batteries had been reduced to a fraction of their efficiency.

Prior to the dust storm, Opportunity's solar panels had been producing about 700 watt hours of electricity per day. That's enough juice to run a 100-watt light bulb for seven hours. As the storm built in intensity, that power generation was reduced to 400 watt hours. On July 17 the solar panels were reduced in efficiency to 128 watt hours.

To conserve energy both Rovers had been parked. Their science functions such as using the robotic arm, cameras, and spectrometers had been suspended and communications between Jet Propulsion Lab and the rovers had been reduced. This marks the first time ever that communications have been curtailed.

But life on Mars isn't a simple matter of hunkering down and waiting out the storm. To be able to reactivate the Rovers, some heat must be maintained in their core electronics – and Mars is a very, very cold place. Plus, no one knows when the storm will subside. There are a couple of reasons why



Now you see it. Now you don't. These 2001 Hubble photographs show how a global dust storm on Mars obscures the planet's surface.

Mars has such gigantic, lengthy dust storms.

One is the fact that the planet is about half the size of Earth. So a global event on Mars doesn't have to be that large. Another reason is that there are no bodies of water to break up the weather. On Earth we may get traces of sand in the atmosphere of New York from a dust storm on the African desert. But we have the whole Atlantic Ocean between the two continents. So New Yorkers won't encounter a dust storm. On cold, dry Mars a dust storm can quickly circle the entire planet, reducing valuable solar energy to minute levels. Then there is the fact that the Martian surface is little more than a giant dust bowl.

The Mars Rovers have survived three years in the hostile environment of the Red Planet. But neither of them are designed to weather the incredible storms as they are currently encountering. However, after six weeks of staying put, the rovers were back in action. The skies have cleared up enough to give the solar panels some energy. Opportunity advanced 13.38 meters (44 feet) on August 21 toward the edge of Victoria Crater and Spirit drove 42 centimeters (17 inches) backwards on August 23 to get in position for taking images of a rock that it had examined with its Moessbauer spectrometer.

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Astrophotos

Aurora Borealis_Iridium

This was taken with a Nikon D200 DSLR with 17-55mm f/2.8G lens at 22mm focal length, f/3.2 aperture, 30 second exposure at ISO400.

Photo by: Phillip Chee phillip.chee@gmail.com

The Milky Way

Camera: Nikon D200
Exposure: 30 sec (30)
Aperture: f/2.8
Focal Length: 17 mm
ISO Speed: 1600

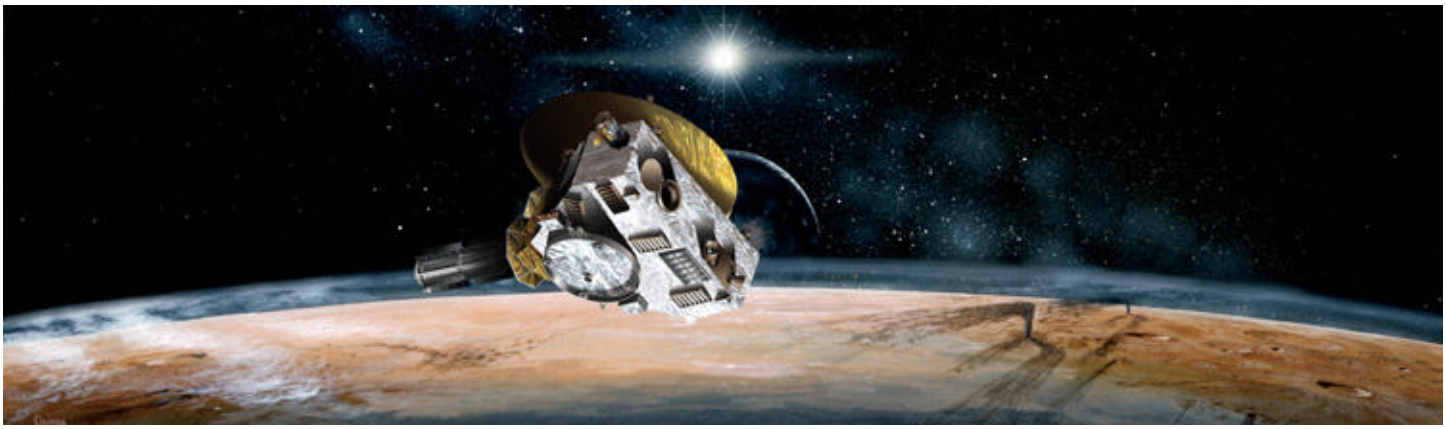
Photo by: Phillip Chee phillip.chee@gmail.com

Satellite Flare

Camera: Nikon D200
Exposure: 120 sec (120)
Aperture: f/2.8
Focal Length: 17 mm
ISO Speed: 400

This a satellite flare of the International Space Station and Space Shuttle Atlantis (docked) photographed as seen from a farm in Otonabee-South Monaghan Township 20 minutes south of Peterborough.

Photo by: Phillip Chee phillip.chee@gmail.com



This artist's concept shows the New Horizons spacecraft during its planned encounter with Pluto and its moon, Charon. The spacecraft is currently using the Beacon Monitor system on its way to Pluto. Credit: Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute (JHUAPL/SwRI)

NASA Space Place

Omit Needless Bytes!

Now is an exciting time for space enthusiasts. In the history of the Space Age, there have never been so many missions "out there" at once. NASA has, for example, robots on Mars, satellites orbiting Mars, a spacecraft circling Saturn, probes en route to Pluto and Mercury—and four spacecraft, the two Voyagers and the two Pioneers, are exiting the solar system altogether. It's wonderful, but it is also creating a challenge.

The Deep Space Network that NASA uses to communicate with distant probes is becoming overtaxed. Status reports and data transmissions are coming in from all over the solar system—and there's only so much time to listen. Expanding the network would be expensive, so it would be nice if these probes could learn to communicate with greater brevity. But how?

Solving problems like this is why NASA created the New Millennium Program (NMP). The goal of NMP is to flight-test experimental hardware and software for future space missions. In 1998, for instance, NMP launched an experimental spacecraft called Deep Space 1 that carried a suite of new technologies, including a new kind of communication system known as Beacon Monitor.

The system leverages the fact that for most of a probe's long voyage to a distant planet or asteroid or comet, it's not doing very much. There's little to report. During that time, mission scientists usually only need to know whether the spacecraft is in good health.

"If you don't need to transmit a full data stream, if you only need some basic state information, then you can use a much simpler transmission system," notes Henry Hotz, an engineer at NASA's Jet Propulsion Laboratory who worked on Beacon Monitor for Deep Space 1. So instead of beaming back complete data about the spacecraft's operation, Beacon Monitor uses sophisticated software in the probe's onboard computer to boil that data down to a single "diagnosis." It then uses a low-power antenna to transmit that diagnosis as one of four simple radio tones, signifying "all clear," "need some attention whenever you can," "need attention soon," or "I'm in big trouble—need attention right now!"

"These simple tones are much easier to detect from Earth than complex data streams, so the mission needs far less of the network's valuable time and bandwidth," says Hotz. After being tested on Deep Space 1, Beacon Monitor was approved for the New Horizons mission, currently on its way to Pluto, beaming back a simple beacon as it goes.

Discover more about Beacon Monitor technology, as well as other technologies, on the NMP Technology Validation Reports page, http://nmp-techval-reports.jpl.nasa.gov.

By: Patrick Barry and Tony Phillips

Binoculars Are Binoculars: No, It Just Isn't So

Earlier this year I came across two inexpensive pairs of binoculars – a 7X50 Vivitar model for $25 at a local liquidation store and a 10X50 Charles Frank model for $10 at a local church garage sale. After putting them through their paces, it got me to thinking that many PAA members, especially newcomers to the hobby, may think that binoculars are binoculars but it just isn't so. Just like there are trashy telescopes, the same holds true for binoculars and, just like there are spotting scopes for daytime use, the same also holds true for binoculars.

We always advise newcomers to astronomy to stay away from department store telescopes and to start their search of the heavens with a pair of quality binoculars. That way they will acquire a better grasp of the night sky while they look forward to the day they can afford a good quality telescope. But not much is said about choosing a pair of quality binoculars. Before you jump at the first pair

Continued...

you come across, you need to know what to look for in a pair of quality astronomical binoculars and how to find them.

Most of the binoculars being made today are for the close-up watching of things during the day, such as for sporting events, hunting, and bird watching. Binoculars made mainly for daytime use do not need the same degree of quality as those for astronomy. Just look at how many trashy telescopes work perfectly fine for terrestrial use and you'll realize why. Binoculars made mainly for astronomy, however, are available but may be hard to find, especially if you expect to get them for around the same cost as most other models. Here are some things for you to look for in your search for better binoculars.

Size Matters

Binoculars are rated by their power of magnification and their aperture – expressed in millimeters. Thus, a 10X50 model magnifies 10 times and has an aperture of 50 mm for each tube. For astronomical use the power level should never be below 7 and the aperture should be below 35 mm. Models in between 40 and 60 mm are the best for portable use as they should be easily held with little or no shaking of the image.

There are models with greater power and aperture that are great for astronomy, often rivaling the views you get from smaller telescopes, but these require tripods or special mounts as they will be far too heavy to hold. Their size and mount requirements also limit their portability.

The author's Vivitar 7X50 and Charles Frank 10X50 binoculars. Note how the UV coatings on the Vivitars are quite bright and reflective – basically eliminating their use for astronomy except for viewing the moon.

Field of View

The field of view for astronomical binoculars should fall between 5 and 7.5 degrees. This is usually printed in the same area as the power and aperture figures. It will appear either as the field of view expressed in degrees or an expression of the number of feet at 1000 yards. To find the amount of degrees from this expression you simply divide the number of feet by 52 and this will give you your field of view in degrees. The Vivitar binoculars have their field of view expressed as 297 feet at 1000 yards which correlates to a field of view of 5.71 degrees. The Charles Frank binoculars, however, has its field of view expressed as 5 degrees.

Coated Optics

This is where many of today's binoculars fail as astronomy tools. All binocular lenses should have some form of coating for protection but many overdo it. Good astronomical binoculars will have anti-reflective coatings to allow for more light to pass through the optical tube while those for daytime use will often have UV coatings to cut down on glare from the sun. This is not a problem for binoculars that are mainly used for daytime use – in fact, it may be desirable to have special UV coatings to make daylight viewing far more pleasant. But these coatings restrict the amount of light that makes it to your eyes. To illustrate this, I focused one night on the famed Coat Hanger cluster in Vulpeca which shines at magnitude 3.6. In the Charles Frank binoculars they are a true beauty to behold and quite brilliant while, due to the heavy UV coatings, they are dim – almost invisible – in the Vivitars.

Only by looking at and into the far end of binoculars lenses can you gauge their light gathering properties by comparing how much they reflect your face back at you. Those with too much coating will have a strong, often colored, reflection of you while making it darn near impossible to see out the other end of the binoculars. Those binoculars that are good for astronomy will still have some kind of a reflection but you should be able to see right through the tube and out the far end.

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The Sky This Month

MERCURY

Mercury is at greatest elongation east on September 29th. It remains close to the western horizon after sunset.

VENUS

The "morning star" rises high in the east and will be reaching its highest magnitude of the year this month.

MARS

Mars is now rises in the late evening in Taurus, and will move into Gemini by the end of the month.

JUPITER

The largest planet in the solar system takes over duties as "evening star" and is found low in the west at dusk, setting by mid-evening.

SATURN

The ringed planet climbs rapidly above the eastern horizon in the morning hours before sunrise. It is found in Leo.

URANUS

This gas giant is up all night. It is in Aquarius.

NEPTUNE

A telescope is usually necessary to view the most distant planet in the solar system. It is found in Capricornus.

METEOR SHOWERS:

There are no major meteor showers for the rest of this month.

Local Astronomers Take Children On A Trip To Jupiter

Members of the Peterborough Astronomical Association recently gathered at the Kinsmen's Civic Centre along with some school children sponsored by the Peterborough Housing Corporation. The kids were enjoying a night of camping out at Alexander Court and Millessa Scott of the PHC thought that it would be a great idea if the kids could also enjoy a little stargazing. Rick Stankiewicz, President of the PAA agreed, and the great space launch to Jupiter was on.

Assembled on the a playing field next to the Kinsman's arena were Rene Bowe with his home build 8-inch reflecting telescope, Boyd Wood with a motorized 4.5-inch reflector, John Crossen with an 80mm refractor and Colin Cross with his 10-inch reflector. By 9:15 the clouds parted to show Jupiter shining brightly to the south. The quorum of amateur astronomers treated about 25 children to their first looks through a real telescope In addition to viewing Jupiter three of Jupiter's four largest moons were also visible. The moons were all lined up in a row, with two moons to on side of the massive planet and one to the other. Galileo first saw them in 1610.

PAA Treasurer, Rene Bowe, treats a line-up of fascinated young astronomers to a look through his telescope. Rene built the scope himself and is always happy to share it with other observers. Photo: John Crossen

The children ranged in age from pre-school to their early teens, so the PAA Public Outreach Team was kept busy adjusting the telescopes for short, then taller viewers. They were equally active fielding a barrage of questions. "How cold is Jupiter?" "What are those streaks across it?" "How come it looks like somebody squished it? Were typical remarks from the curious minds at the other ends of the telescopes. As the kids moved from one telescope to another comparing the views, they were given some facts about Jupiter. Most of the older children already knew that it was the largest planet in our solar system. But they were still amazed when they were told that Jupiter was 1,000 times larger than Earth.

In addition to learning that Jupiter was the solar system's largest planet, they also were told that it was composed entirely of gas. Hydrogen, Helium, with trace elements of methane and more make up the huge ball. In fact Jupiter is made of the same elements as our Sun. Were it about 80 times larger than it is Jupiter would generate enough heat and pressure at its core to become a brown dwarf star. Imagine having two suns!

Shortly after 10:00 the youngest astronomers began yawning and it was time to tuck into the tents for the night. On behalf of the Peterborough Astronomical Association, it was a treat to share our interest with such inquisitive young minds. Who knows, the next Chris Hadfield, or Roberta Bondar might have been in our audience that night.

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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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TENTATIVE OBSERVING SCHEDULE 2007

OCT 12TH	Buckhorn Observatory
NOV 9TH	McDonald Observatory
DEC 14TH	Buckhorn Observatory

PAA Observing runs are held on the Friday nearest New Moon. The public is invited. In case of cloudy weather on Friday, the following Saturday will be the back-up session. Set up time will be at dusk which means we'll be getting together anywhere from 7:00 pm in the winter until 9:30 pm during the summer months. Coffee and doughnuts are supplied.

The host observatory calls the 'go' or 'no go' on weather – smart people call in advance.

Phone numbers are:

Buckhorn Observatory 705-657-7718

McDonald Observatory 705-696-2977

J O K E ! J O K E ! J O K E ! J O K E !

According to astronomers, next week Wednesday will occur twice. They say such a thing happens only once every 60,000 years, and, although they don't know why it occurs, they're glad they have an extra day to figure it out.

! J O K E ! J O K E ! J O K E ! J O K E

ARTICLES

Submissions for ***The Reflector*** must be received by the date listed below. E-mail or "sneaker-net" (i.e., floppy disk) submissions are preferred (Microsoft Word, ASCII and most graphics 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 this address:

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or via e-mail at:
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Please contact me first if you are sending a large file.

NEXT ISSUE'S DEADLINE IS
Sept. 25, 2007

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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 **8:00 pm**.

Moon Phases

Last Quarter	**September 3, 2007**	**October 3, 2007**
New Moon	**September 11, 2007**	**October 11, 2007**
First Quarter	**September 19, 2007**	**October 19, 2007**
Full Moon	**September 26, 2007**	**October 26, 2007**