Peterborough Astronomical Association

The Reflector

Volume 8, Issue 10 ISSN 1712-4425 December 2009

Artist's rendering of cosmic collision involving two objects whose combined mass was at least twice that of our Moon. Discovered using the Spitzer Space Telescope in the planetary system of a star called HD 172555 100 light-years away.

by Patrick Barry and Dr. Tony Phillips

Two small planets hurtle toward each other at 22,000 miles per hour. They're on a collision course. With unimaginable force, they smash into each other in a flash of light, blasting streams of molten rock far out into space. This cataclysmic scene has happened countless times in countless solar systems. In fact, scientists think that such collisions could have created Earth's moon, tilted Uranus on its side, set Venus spinning backward, and sheared the crust off Mercury.

But witnessing such a short-lived collision while pointing your telescope in just the right direction would be a tremendous stroke of luck. Well, astronomers using NASA's Spitzer space telescope recently got lucky.

"It's unusual to catch such a collision in the act, that's for sure," said Geoffrey Bryden, an astronomer specializing in extrasolar planet formation at NASA's Jet Propulsion Laboratory and a member of the science team that made the discovery.

When Bryden and his colleagues pointed Spitzer at a star 100 light-years away called HD 172555, they noticed something strange. Patterns in the spectrum of light coming from nearby the star showed distinctive signs of silicon monoxide gas — huge amounts of it — as well as a kind of volcanic rock called tektite.

It was like discovering the wreckage from a cosmic car crash. The silicon monoxide was produced as the high-speed collision literally vapor-

see "Crash-bang" on page 16

President's Message

Year Endings and Year Beginnings

It is hard to believe that we are into the last month of 2009, The International Year of Astronomy. I don't know about you, but this year has surpassed my greatest expectations. By the time you read this, our small (but mighty) club will have racked up about 2,300 Galileo Moments (GM) for the year, therefore added significantly to the national goal of well over one million GM's! Thank you to those that helped make this a reality.

At the time of this writing, we are preparing for our next Annual General Meeting (AGM). I hope that that those that are able, step up and do what they can for this club. I know we have a few positions to fill and we need key people in key positions. Anyone who can help out will be greatly appreciated in any role they can play.

We have had a very busy year and hope we can carry through into 2010 with a little bit of this momentum. There are a number of projects that we can start to work on or prepare for early in the New Year. Great strides are being made in light pollution abatement locally and we will continue to foster these efforts. There are regional (April) and national (May) science fairs to be hosted locally (Trent University), Astronomy Weekend (May), raffles, public viewing sessions in various locations like provincial parks?

If you have any ideas for public outreach or our own monthly meetings, let your executive know and we will do what we can to make it happen. The New Year promises exciting opportunities like Skype presentations, which will potentially bring famous and knowledgeable people from around the world into our monthly meetings. How exciting is that?

Merry Christmas! May you and your families have a safe and Happy New Year! I look forward to another year of exploring the universe with all of you.

Rick Stankiewicz, President

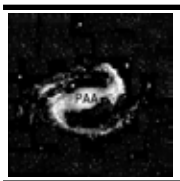
Editor's Message

Another exciting year in the local astronomy scene comes to a close this month. I think our International Year of Astronomy efforts have been a great success. For the most part Mother Nature has cooperated with our public viewing sessions and forcing us to cancel only two of our IYA events if I recall.

With the holiday season upon us John Crossen has a three-part series of telescope buying advice to help you make the best decision when telescope buying. He also concludes the third and final installment of *Looking Back Through the Telescope*.

John Galle brings us another wonderful review this time off the Nova Sedis Star Party. Rick Stankiewicz previews is DDO postal cover envelopes. These look to be great souvenirs. And Jim Webster sends in a wonderful image of M33 for us to enjoy.

Phillip Chee



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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Cool Winter Targets

For Warm-blooded Astronmers

People frequently ask me what the best season for stargazing is. I usually tell them any night that it's clear. However, if I had to single out one time of year when I enjoy staring at the stars the most it would be winter. Aside from the fact that you're bundled up to the point that you look like Bib, the Michelin man, the winter sky sparkles with some delightful targets And most of them are visible in binoculars.

Let's start with Orion the mighty hunter. The big guy is up in the east just after sunset in early winter. Just below the three stars that form Orion's famous belt is a fuzzy blur known as the Orion Nebula. It is naked-eye visible, and a simple pair of hand-held binoculars will reveal the huge nebular cloud of gas and dust surrounding the 4 stars called the Trapezium. Within that nebula new suns are birthing and new planets are forming in the dusty rings surrounding the proto-stars.

Another naked-eye target is the seven sisters of the Pleiades. Usually referred to as the Pleiades, this fuzzy little patch bursts into a gorgeous fireworks display in binoculars. It is one of the closest open star clusters to planet Earth — just 440 light years away. To convert 440 light years to kilometers multiply 10 trillion by 440. Hum, better pack a lunch for the trip.

Directly beneath the Pleiades is a V-shaped group of stars representing the

see "December" on page 15

BUNDLED UP FOR STARGAZING. A warm coat, a star chart and clear skies. What more could you ask for? OK, maybe a hot chocolate.

Looking Back Through the Telescope — Part 3

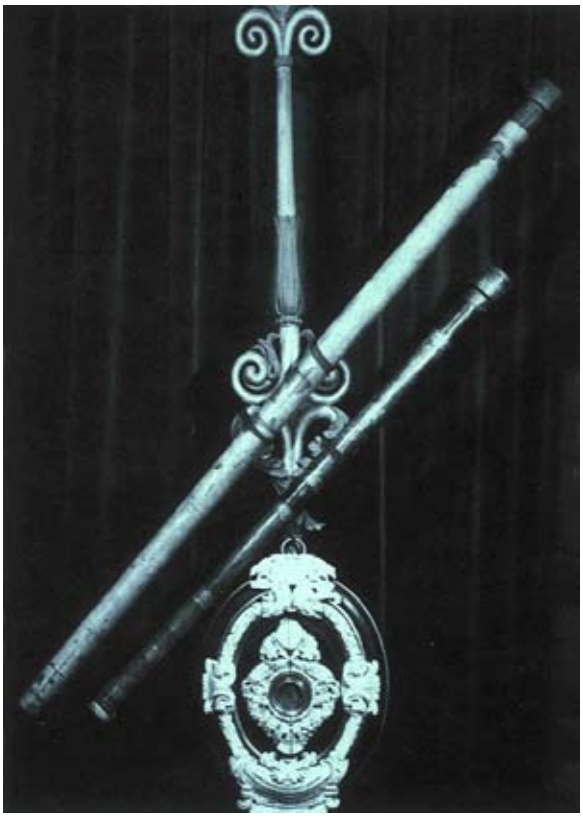
When Nicholas Copernicus was born in 1473 the telescope was still 136 years in the future. But the reawakening of science and learning had already begun. Whether it was the invention of the printing press or the compass that sparked the new age, no one knows. But the dark ages and the tyranny of the church were slowly coming to an end.

Copernicus, like Galileo, was a very religious man. He was a Canon in the Church. Still, he thought that a sun-centred universe more easily explained the motion of the planets. At the time no one knew of distant galaxies, so the Sun, stars, and five known planets were the universe.

He reasoned that the Earth was just one of the planets orbiting the Sun. Our smaller orbit moves us around the Sun more quickly than Mars, Jupiter or Saturn. Therefore they appear to stop and move backwards as we pass them. He also reasoned that it was the Earth's rotation that gave us our day/night 24-hour cycle. If you think he sounds a lot like Aristarcus of Samos about 2,000 years earlier you are absolutely right.

Copernicus was urged to publish his thoughts in a book, but he was wisely reluctant to do so. Finally the book was printed and delivered to Copernicus on his death bed. When news of the book reached the Church it was promptly placed on the forbidden list. Still, a Canon of the Church had pushed us further into the age of enlightenment.

Let's time-warp forward to the year 1600 when a math teacher named Johannes Kepler was struggling to understand the universe through mathematics. He was firmly convinced that God was not a divine ruler, but a creative force within the universe. But to progress, Kepler needed more accurate data. Thus he showed up at the door of Tycho Brahe, a Danish astronomer whose techniques and tools for measuring the motion of stars and planets were the state of the art for the time. They were just what Kepler needed.



GALILEO'S SCOPE. It doesn't look like much, but Galileo's telescopes proved that the sun-centred universe of Aristarcus & Copernicus was correct. Galileo spent the last years of his life under house arrest for speaking the truth.

Brahe lived in a regal castle and had a taste for partying that equaled his lust for knowledge. He was also prone to arguments, one of which was settled by a duel with swords. Tycho lost by a nose — literally. However, being a rich man, a wooden substitute would never do. And so a golden nose was cast to replace the one lost in the duel.

see "Laws of Motion" on page 14

Only a Grinch Would Sell a Christmas Trash Scope

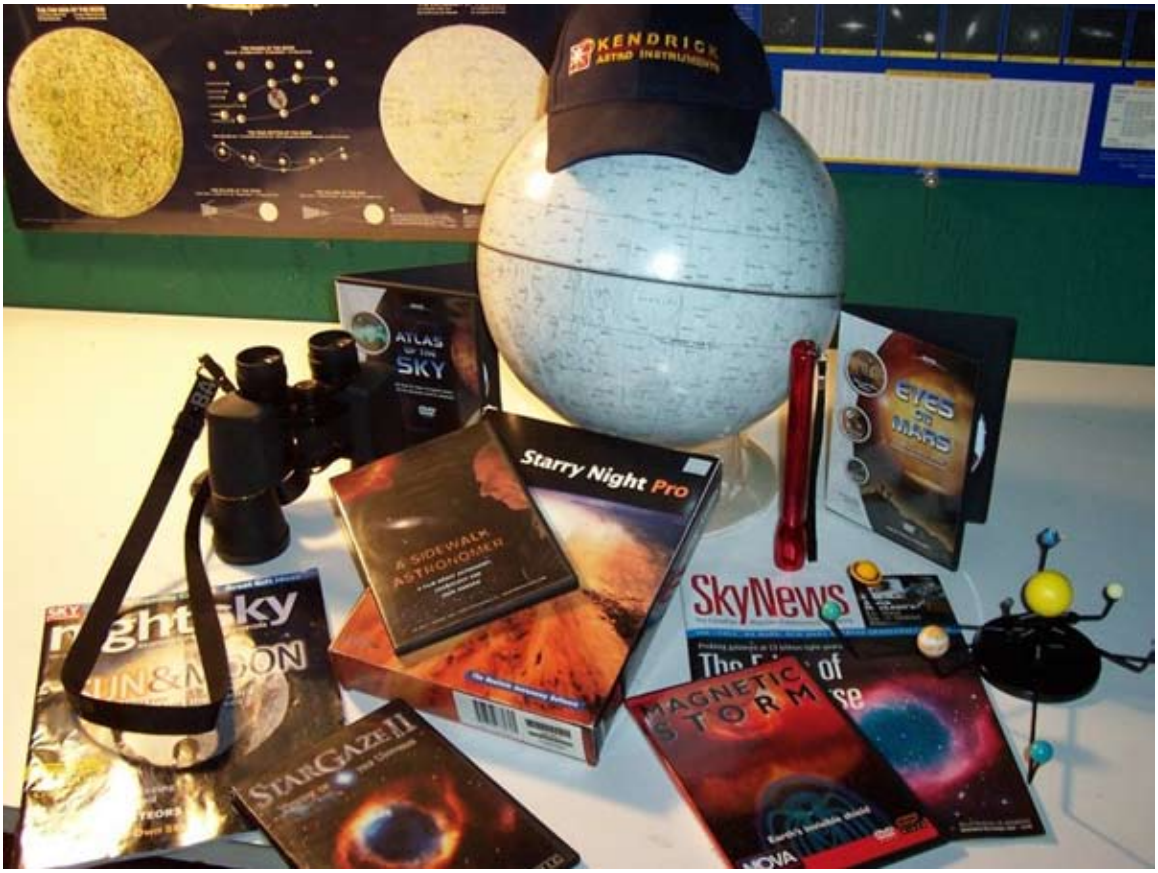
I love astronomy and I love to see people get involved in the hobby. But come Christmas and I'm going No-No-No not Ho-Ho-Ho. The reason is trash scopes from the big box stores. For as long as I've been writing this column, my first article for the month of December is a rant about trash scopes at Christmas. 2009 will be no different.

Buy a telescope from a big box store and you're almost guaranteed to be buying a piece of junk. It will gleefully quote numbers like 450 power magnification, when its flimsy tripod is hard pressed to hold it steady at 75 power. It will come with a little telescope called a finder that is not much larger than a pencil and can find nothing other than the Moon. But it will be bright and shiny with lots of handles and knobs on it.

Then there's the person selling it. Chances are they were in the sports wear department last week. So if you're looking for expert advice, look elsewhere.

The best bet for you is to avoid telescopes altogether. The first thing a beginner needs to do is to learn his or her way around the night sky. Can your giftee find Polaris? Can they spot the Little Dipper? Where is Orion, Taurus the bull, Canis Major or Cassiopeia? If they can't say yes to all of the aforementioned, the first thing they need is a book like *NightWatch* (available at Happenstance Books) which has some great star charts in it. Plus it contains enough additional information to keep a beginner occupied for a year of observing. It has a chapter on buying a first telescope — when you're ready!

see "Trash Scopes" on page 15



CHRISTMAS ASTRO GIFTS. Instead of buying a trash scope why not try astronomy books, astro-magazines, binoculars, DVDs, a planisphere, a red night light or a Moon globe? There's plenty to give that's cheaper and better than a trash scope.

Telescopes For the More Advanced Beginner

Now that we've got the absolute astronomical beginner covered, let's look at what's out there for the novice who has learned his or her way around the night sky. That means they can point out the current seasonal constellations such as Orion, Gemini, Auriga, and the Seven Sisters.

At this stage the stargazer giftee is ready for a closer look at what's up there. And that means a telescope — but not from a big box store. Instead concentrate your search at a specialized astronomy store. Telescopes aren't rocket science, but getting a good one that suits the observing needs of the individual takes a bit of digging about.

STARBLAST 6" SCOPE. I've used the Orion 6" StarBlast and it is excellent. For the gadget fiend, there's a model with digital setting circles to help locate deep-sky objects.

Factors such as portability are important for those who have to get out of town to find dark skies. Also, what is the stargazer most interested in? The Moon and major planets are all visible in small aperture telescopes. Aperture is the distance across the front lens or the mirror in Newtonian telescopes. The bigger the aperture, the more light the telescope gathers and the brighter the images are through the eyepiece. If the prime targets are faint deep-sky objects such as distant galaxies and star clusters, a scope with a 100mm to 150mm aperture is the starting point. What's out there for looking up?

SkyWatcher has just released a new line of starter scopes that deliver outstanding value for the money. Called the Heritage Series, these scopes are simple Dobsonian designs. They sit on a table top, so there's no rickety tripod to lug along. They also have good optics and they are very easy to use – just push, point and peek. King of the Heritage hill is the 130mm model at about $250, this scope is a keeper that'll have your astro-nut out every clear night for the next couple of years.

Close behind is the Heritage 76mm. This little gaffer sports a 3-inch aperture and is best suited to the youngster observer who wants to explore the Moon and planets. Like its bigger 130mm brother it is a simple-to-use Dobsonian design. It's also perfect for townies and cliff-dwellers who don't need dark sky to see the moon and planets. At less than $50 for the little guy, this is a bargain supreme. To read more about them, pick up the Nov/Dec issue of *SkyNews Magazine*. Chapters is the place to find *SkyNews*.

Orion Telescopes have an even more extensive line of beginner scopes. My

recommendation is the StarBlast series. Most of these scopes are user-friendly Dobsonian styles. Apertures range from 76mm up to 150mm for a model that can either sit on a table or on the ground for short astronomers. Some models also feature tripods. Prices range from $49 to $276 for the 150mm model.

Celestron also have their version of the above-mentioned mini-Dobs. Called the Heritage scope, it is limited to the 76mm (3-inch) model and is available with an optional eyepiece series which I recommend purchasing. Pricing is similar to the other scopes.

There are lots more scopes available, but the ones I have highlighted are what I think would be best for the beginner. Below we'll talk about where to buy a telescope. There are dealers nearby who have good telescopes and good advice.

John Crossen

Good Telescopes and Good Advice Come From an Expert

Generally speaking a shop that specializes in telescopes is run by someone who is also an amateur astronomer. Chances are they have been through the same learning experiences that you are encountering now, so they probably know what you'll ask and what you need. They're also on top of the latest developments in the telescope market so their advice is up to date.

I know my friends in the business would soap my lenses for saying this, but most telescope outlets are very similar. Almost all will stock or can order the major brands such as Celestron, Meade, Sky-Watcher, Orion and a couple of high-zoot scopes like William Optics and Tele Vue. With rare exception prices won't vary much. In order to stay in business, their profit margins are all about the same. A lot of U.S. advertising spills over into Canada so just make sure you're both talking Canadian dollars.

Here are some nearby retail outlets. Most have toll-free numbers as well as on-line catalogues. So far I've had good experiences with them all.

In Toronto you'll find EfstonScience. They're located 3350 Dufferin Street just south of the 401. They stock a very large range of telescopes and ship across Canada as well as internationally. Their website is: www.telescopes.ca and the toll free is 888-777-5255. Check the website first and give them a call to help with your decision making.

KW Telescope in Kitchener/Waterloo is another reputable dealer. They stock a

see "Good Scopes" on page 13

MEADE MY SKY. It's not a telescope, but the Meade My Sky can teach you a lot about what's up. Just point it at an object and it can identify a constellation, a planet, a star or find a deep sky object. My Sky easy to use, fun and takes the stiff bend out of the learning curve. Celestron also makes a similar product called the SkyScout that is priced competitively at about $200.

PHOTO GALLERY

Fun With Jupiter and the Moon

On the early evening of November 23rd, the Moon was a day from first quarter phase and nicely centered in the southern sky. What was that bright star like object 2 degrees below it? Jupiter of course and what a lovely site it was. Celestial pairings like this are not rare, but always a welcome treat to those that are "looking up". Of course a thin veil of clouds threatened to cover this beautiful sight before I even got started.

I just had to grab my camera and tripod and try a few shots. The attached images are the results of some of the fun I had before supper this particular evening. The first image is a cropped view of what reminded me of a stellar birthing cloud (not unlike M42, the Orion Nebula). It is of course just our Moon illuminating the clouds of our own atmosphere. Note Jupiter as the bright "star" in this image.

The next image captured some familiar lunar nebulosity again, but look closely at Jupiter this time. Do you see what I see? Three of the largest planet's own moons are visible in this shot! "Not bad", I thought upon inspecting my images. I had never managed to capture such details with my digital camera and just a telephoto lense before. Yes, the planetary disk is over exposed, but the tiny moons show up quite clearly and they are about 750 million kilometers away from me!

The last image proved that my eyes were not playing tricks on me. In this cropped and enlarged portion of another image taken this evening, there was Jupiter and three of it's moons beyond a doubt. It looks like Io is to the left of the planetary disk, while Callisto and Ganymede are to the right.

Europa is lost in the shuffle and glare I think. I can see now just how excited Galileo must have been when he saw these things for the first time.

What a lot of fun for a simple alignment of a planet and our Moon. All these images were initially taken with a Canon 400D camera and Sigma 70–300mm lense mounted on a tripod on my deck at home near Keene (settings were all, ISO 800, f/5.6 and 1.6 second exposures).

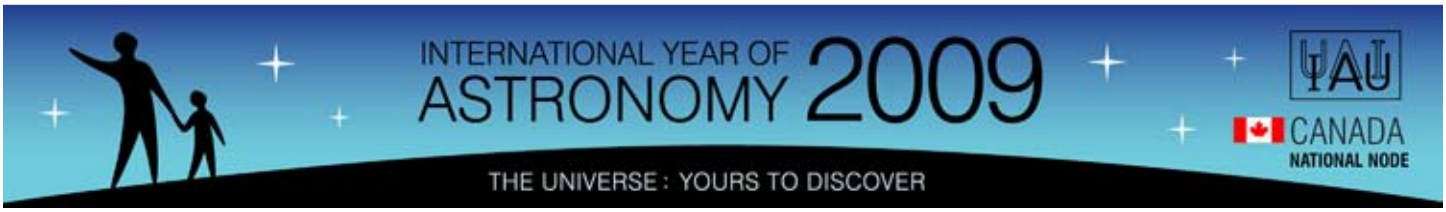
Keep looking up (it can be a lot of fun),

Rick Stankiewicz

M33 Triangulum Galaxy

This time of year M33 is directly overhead, far away from the light pollution on our horizon. It's about 2 million light years away, a distance similar to the Andromeda galaxy, and may be a satellite galaxy of it. It contains about 8 billion stars. This photo was a composite of fifteen 5–minute exposures through the telescope.

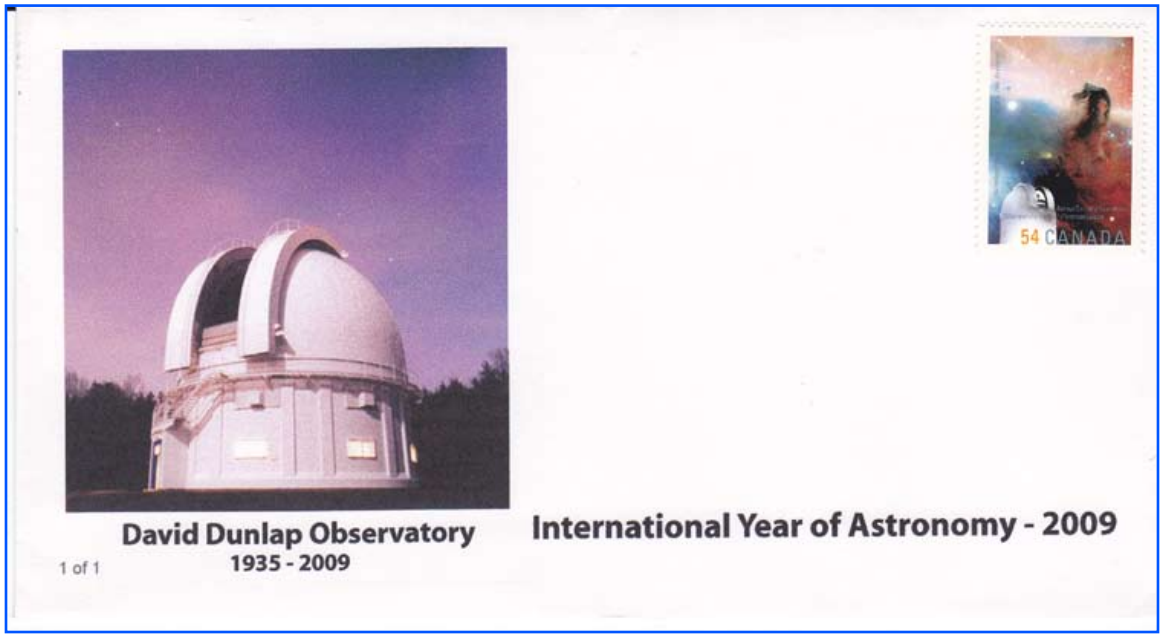
Jim Webster



Limited Edition Postal Covers of the David Dunlap Observatory

This is a very unique opportunity to have a special souvenir for the International Year of Astronomy (IYA). By the time you read this article you may only have a few days left to pre-order your set of two special postal "covers" (envelopes) that are being designed to celebrate both the DDO and IYA! If you are interested for yourself or anyone else you know that might be interested, let me know by December 13th.

Attached is a sample DDO limited edition stamp "cover" envelope that I am designing. All that is missing is the special Canada Post cancellation that will go in the upper right to officially cancel the postage stamp that is affixed. Because there are two stamps in the series, I am designing a second "cover" with a different photo of the DDO on the left side and then using the second stamp on the right side to be cancelled. I will likely only be doing a



small number of these (depends on interest in advance). I expect that each envelope will be about $5 (set for $10).

The cancellation is as you see (top-right of this page) and is about 2.5cm (1") in size. It will be applied to each cover. The combination will look much better and sharper than shown here. It will make for a unique souvenir for IYA, whether you collect stamps or not.

I plan on including an information card about the history of the DDO in each envelope.

For more information and to order contact me directly, but don't delay:

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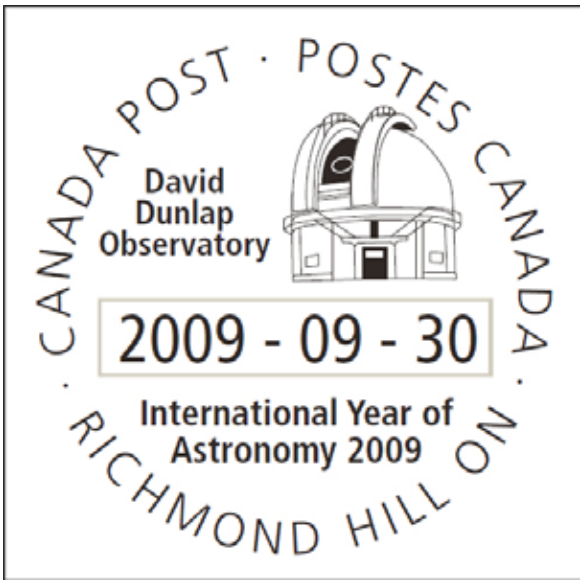

Chiefland 'Nova Sedis' Star Party

If you are looking for an early winter break this star party is for you. Just a short 2,200 km pleasant drive is the Chiefland Astronomy Village in north central Florida, near to the so-called Nature Coast. The village was founded about 20 years ago and now has some 20 residents (as one member described it, 9 roll-offs and 10 domes). It consists of a variety of private homes along with a very large unobstructed viewing field, equipped with a club house, electrical grid, wi-fi, etc. — this is definitely not a shabby place. The site is noted for good seeing except during the humid times of the year, and the light pollution is the best anywhere in Florida. There is a wide outreach membership that pays $35 per year for the privilege to camp and observe on the site whenever they want — I sure wish we had something like this a little nearer to us. The site had been the location of the Winter Star Party when the Keys property was destroyed by a hurricane.

The big event is the Fall Star Party, held in November and lasting 6 nights, with attendees welcome to stay longer if they want. This year, due to Hurricane Ida, the first 3 nights of the event were totally clouded; after that it was perfect, great seeing and night temperatures in the 40's. Unfortunately due to the unfavorable weather many of the 220 registered attendees were no-shows. While all types of attendees are welcome this is a mecca for serious astro imagers from all over the US. Due to this many of the sessions were on imaging and processing, from beginner to very advanced. They try to divide up the field into like minded people, with separate areas for imagers, Mallin Cam users, and star gazers. The party does attract top-flight presenters – this year including Jack Newton (Canadian, co-founder of this and other astro villages, discoverer of 25 supernovas, etc, etc), Tippy D'Auria (founder of the Winter Star Party), Jonathan Talbot (hurricane hunter, leading astro imager), etc.

NGC7331 taken at the party by the winner of the imaging contest

While the sessions keep you busy during the day there are also places to go nearby, including Manatee Springs State Park and Cedar Keys. To make the trip down there more interesting you can, as I did, take the Blue Ridge Parkway, a 600 mile long park with fabulous views, sites to see, and no traffic or traffic lights.

As an extra bonus those of us that stayed after the official star party got to see an excellent view of the shuttle launch on Nov 16, Cape Canaveral bring directly across the Florida peninsula from Chiefland!

Next year the party will tentatively be held the first week of November. An added attraction is that Adam Block, the CCD imaging guru, will be attending. He will also be doing a workshop of 3 days duration either immediately before or after the party; this will be at a much reduced rate from the normal $800 fee, so it may be well worth considering.

See you there!

John Galle

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Good Scopes

good range of telescopes and mounts. Just click up www.kwtelescope.com and have a look at what's in the store. Their phone number is 519-745-5757.

One of my favourite stores is Perceptor in Schomberg, Ontario. The website is www.perceptor.ca and the toll-free is 877-452-1610. Perceptor stocks both new and used equipment and carry a wide range in terms of quality and price. The owner is a very knowledgeable observer with years of telescope experience.

Focus Scientific is just around the corner at 911 Carling Avenue in Ottawa. Their website is www.focusscientific.com and the toll free is 887-815-1350. You can also email them at sales@focusscientific.com.

In Barrie you'll find Astromechanics. Again, they stock a wide range of scopes and you can order directly from their online store. Their website is excellent. Click up www.astromechanics.com or call 866-966-0625 at no charge.

I hope this mini-series has been useful in helping you to choose an astro-gift this Christmas. Until we meet again by the backyard telescope, keep your outdoor lights dimmed down and the stars up big and bright so everyone can enjoy them.

John Crossen

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Laws of Motion

Eventually Brahe popped his socks due to his reluctance to go to the bathroom during one of his parties. With Brahe's somewhat inglorious passing Kepler gained full access to Brahe's data. In the year 1605 he was able to deduce that the planetary orbits were not the perfect circles, but elliptical. Kepler called this "a cart full of dung," but in the end it was correct. And so, Kepler's Three Laws of Planetary Motion were born.

Law One states that the Sun is just offset from the centre of the solar system.

The second law says that the planets move faster when closer to the Sun. And the third law states that the inner planets move faster in their orbits than the outer planets.

In 1609 the telescope was born and the age of enlightenment sprang forward. Until we meet again by the backyard telescope, keep your lights aimed down.

John Crossen

Moon Phases

Full Moon	2:30 AM	December 2
Last Quarter	3:42 PM	December 9
New Moon	7:02 AM	December 16
First Quarter	12:36 PM	December 24
Full Moon ("Blue Moon")	2:13 PM	December 31

The Sky this Month

Mercury is an evening star throughout the month. Reaches greatest elongation (20°) east. Brighter before elongation east but telescopically more interesting afterwards because it will be in crescent phase.

Venus is near the sun during the month.

Mars in Leo all month and is stationary on the 21st and begins its retrograde loop afterwards. Approaching opposition on Jan. 29, 2010.

Jupiter transists near sunset. It passes 0.6° south of Neptune during the evening of the 19th. Jupiter is 4° south of the crescent Moon on the 21st; maybe possible to see daytime apparition using the Moon as a guide.

Saturn near celestial equator and rises about 40 minutes after local midnight the 15th.

Moon 2:23PM is the greatest point of eclipse for the partial eclipse on the 31st. This month is a "Blue Moon" month with two full moons on the 2nd and 31st.

Ursid Meteors peak at 9 AM on the 22nd.

Winter Solstice arrives at 2:47 PM on the 21st.

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December

horns of Taurus the bull. The bright orange star that marks the bull's eye is called Aldebaran. Just up and to its left is a large open group of stars called the Hyades. They're best seen in a pair of binoculars.

Another naked-eye star cluster is nearly straight overhead this winter. It's called the Double Cluster and is between Cassiopeia and Perseus. It's a real neck-bender at this time of year, but is worth the effort, especially if you have binoculars.

Gemini, the twins, is home to yet another good binocular target — M35, one of the nicest open clusters visible in binoculars or a telescope. And if you like knocking off lots of star clusters in a single constellation, Auriga is home to Messier Objects M36, M37 and M38. Again, they are all binocular targets, perfect for the beginning astronomer.

With any luck you will receive Canadian author Terry Dickinson's book *NightWatch* from Santa at Christmas. If not, scoop up a copy at Happenstance Books in Lakefield or any one of the big box book stores in Peterborough. Another alternative to the book is a copy of *SkyNews Magazine*. It has excellent star charts and is written at a level the works for beginners and advanced level astro-buffs equally well. Again, a big box book/magazine shop is your best bet for finding a copy.

So next clear night, bundle up and start looking up. With so much available, winter is a great season for taking in the night sky. Not to mention the fact that there are no bugs and your beer stays cold all night.

Until we meet again by the backyard telescope, keep your lights dimmed down and the stars up bright. Happy holidays whatever you celebrate.

John Crossen

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Trash Scopes

What else is out there other than a telescope? A planisphere is another handy astro-tool. You rotate it so the current date and time match up then hold it over your head and there the constellations are. Connect the dots and you're off to the stars.

As the novice progresses, a pair of binoculars are a very useful addition to their astro-gear. With binoculars you can spot such winter targets as the Orion Nebula, the Pleiades, the Bee Hive Cluster, the Andromeda Galaxy and a host of star clusters. If all that was "Greek" to you, do you really think a bad telescope will help? In most cases the trash scopes are such a pain to set up they actually cause people to not go observing.

Then there are GoTo scopes. I have never talked to anyone who purchased one in the $200+ category and had it work. I have a cheap-o Meade GoTo mount in my observatory which you are welcome to pickup and take home for free. It never worked for the person who gave it to me. It hasn't worked for me. And probably never will for you. Now if you want to spend a couple of thousand dollars, GoTo scopes become a whole different story. But unless you're rich (or a few fries short of a Happy Meal), that's a bundle for a beginner.

The fact is you can't buy astronomy. You have to learn it. So start at the bottom (read cheap) and work your way up. Until we meet again by the backyard telescope, keep your lights dimmed down, the stars up bright and please, please don't buy a Christmas trash scope.

John Crossen

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Crash-bang

ized huge volumes of rock, which is made largely of silicon and oxygen. The impact also blasted molten lava far out into space, where it later cooled to form chunks of tektite.

Based on the amount of silicon monoxide and tektites, Bryden's team calculated that the colliding planetary bodies must have had a combined mass more than twice that of Earth's moon. The collision probably happened between 1,000 and 100,000 years ago — a blink of an eye in cosmic terms.

The scientists used the Spitzer space telescope because, unlike normal telescopes, Spitzer detects light at invisible, infrared wavelengths.

"Spitzer wavelengths are the best wavelengths to identify types of rock," Bryden says. "You can pin down which type of rock, dust, or gas you're looking at."

Bryden says the discovery provides further evidence that planet-altering collisions are more common in other star systems than people once thought. The "crash-bang" processes at work in our own solar system may indeed be universal. If so, Spitzer has a front row seat on a truly smashing show.

See Spitzer Space Telescope's brand new Web site at http://spitzer.caltech.edu/. Kids can learn about infrared light and see beautiful Spitzer images by playing the new Spitzer Concentration game at http://spaceplace.jpl.nasa.gov/en/kids/spitzer/concentration.

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

THE UNIVERSE
YOURS TO DISCOVER

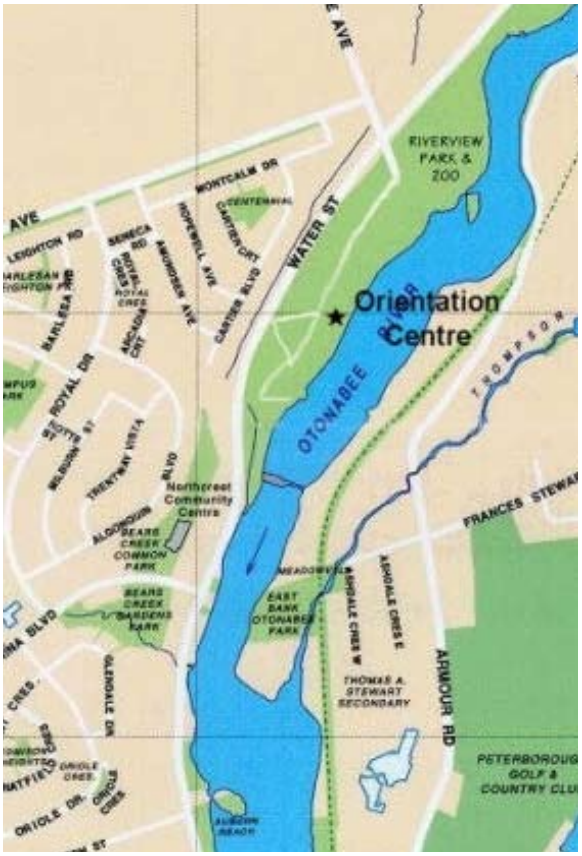
INTERNATIONAL YEAR OF
ASTRONOMY
2009

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 24, 2009



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.