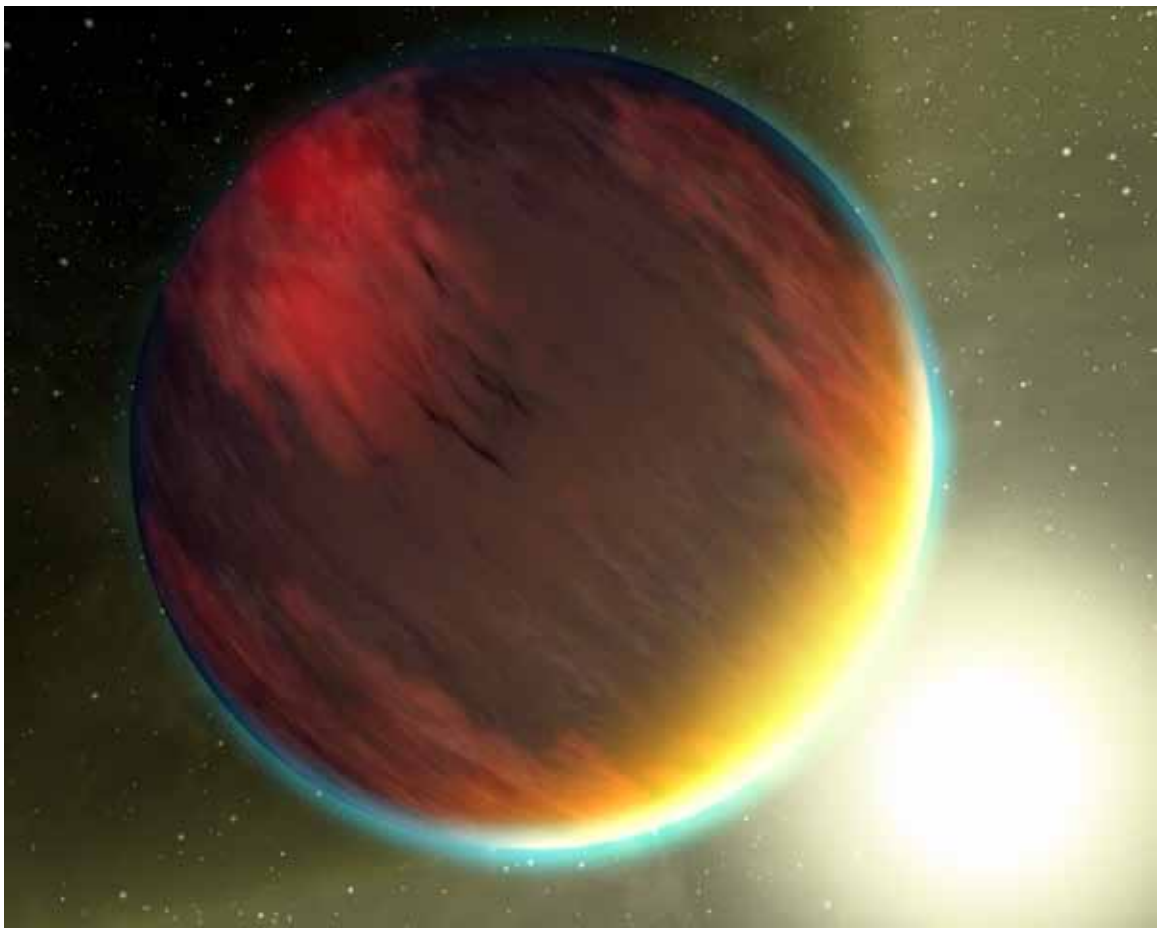
Peterborough Astronomical Association
The Reflector
Volume 9, Issue 8 ISSN 1712-4425 October 2010

The Hunt is On!



By Carolyn Brinkworth

The world of astronomy was given new direction on August 13, 2010, with the publication of the *Astro2010 Decadal Survey*. *Astro2010* is the latest in a series of surveys produced every 10 years by the National Research Council (NRC) of the National Academy of Sciences. This council is a team of senior astronomers who recommend priorities for the most important topics and missions for the next decade.

Up near the top of their list this decade is the search for Earth-like planets around other stars—called "extrasolar planets" or "exoplanets"—which has become one of the hottest topics in astronomy.

The first planet to be found orbiting a star like our Sun was discovered in 1995. The planet, called "51 Peg b," is a "Hot Jupiter." It is about 160 times the mass of Earth and orbits so close to its parent star that its gaseous "surface" is seared by its blazing sun. With no solid surface, and temperatures of about 1000 degrees Celsius (1,700 Fahrenheit), there was no chance of finding life on this distant world. Since that discovery, astronomers have been on the hunt for smaller and more Earth-like planets,

see ***Astro2010*** on page 16

President's Message

Welcome Back!

The fall is officially upon us and the Harvest Moon of September 23rd marks the passing of the equinox. The days will gradually get shorter and the nights longer, but the skies will be clearer and colder which means even better observing.

There have been a few things happen since last you turned the page of a *Reflector*. There have been star parties, trips to member's observatories, rare Jovian close encounters and public presentations, some of which you will find out more about in this issue.

There is a great fall line-up of speakers and presentations, so I hope you will be able to avail yourselves of these opportunities at our monthly meetings. Some members and guests put a lot into these events. Just like this monthly newsletter and our club website, we are never disappointed and often amazed at what is going on, but you still have to make a little effort to have it pay off. I am hoping that this issue of *The Reflector* will feature some new talent too.

I am looking forward to this issue as always and I hope you are too.

Rick Stankiewicz
President

Letter to the Editor

Busy, Busy, Busy

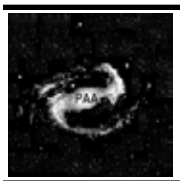
Just when you think back to school was busy, who'd have believed that October would quickly arrive and you'd still be busy. That's the case with your friendly neighbourhod newsletter editor. So, please excuse the tardiness of publication of this October issue.

Having said that I believe the wait was worth it. I want to highlight that PAA member Ben Morgan has written a nice article on the problems of the Dark Flow (no, not the Dark Force of the *Star Wars* kind!) It is longer than our usual articles, but the topic requires it. Ben has indicated he would like to continue writing a series of astrophysics articles. We would like that so much.

Hopefully, Comet Hartley 2 will provide us with some nice views as it nears the Double Cluster at the end of the first week of the month. Perhaps someone will submit a nice photography for the November issue.

So, enjoy a belated October *Reflector*!

Phillip Chee,



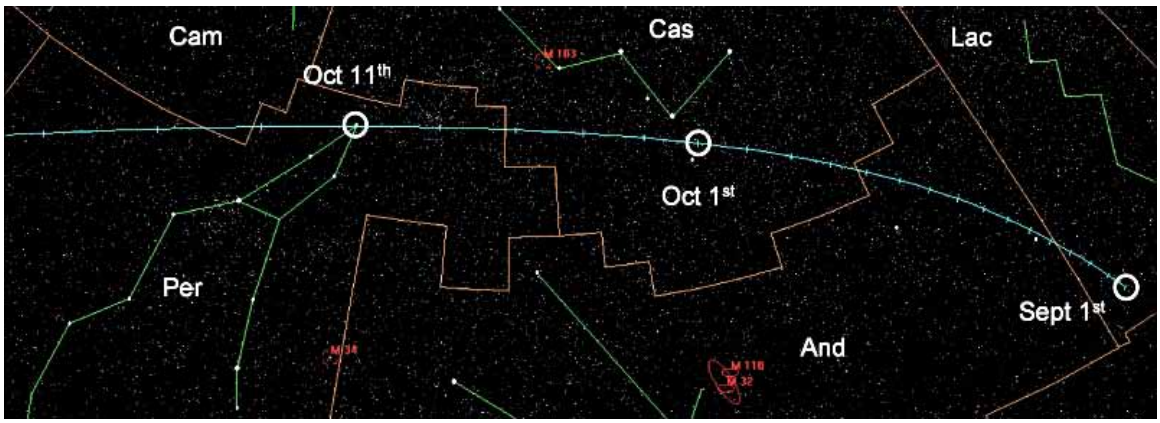
Peterborough Astronomical Association

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

www.peterboroughastronomy.com
stankiewiczr@nexicom.net
Club Mailing Address
Rick Stankiewicz, President

Peterborough Astronomical Association
10 Hazel Crescent, RR #8
Peterborough, ON K9J 6X9
705.295.6158

Here Comes Comet Hartley 2



Comet Hartley's sky chart. Here's where and when Comet Hartley will appear as it moves along the eastern and northeastern sky. It will pass near Cassiopeia, Andromeda, Perseus and the dim constellation Camelopardalis.

Break out the binoculars boys and girls we've got a visitor. Its name is Comet Hartley 2 and it will be a great binocular and small telescope target for backyard astronomers.

On October 7th Hartley 2 is expected to reach magnitude 5 or 6. That places it right on the edge of naked-eye visibility if you are in a good dark-sky location. It will be high in the northeast sky swooping just 1 degree beneath the Double Cluster, a delightful grouping of two 4.3 magnitude star clusters that lie between Cassiopeia and Perseus. The combination of the star clusters and the comet should make for an excellent photo opportunity. Even a tripod-mounted DSLR medium telephoto with a 30 to 45-second exposure should pick the clusters and comet up quite nicely.

On October 20th Comet Hartley 2 will make its closest approach to Earth and on the 28th our cosmic interloper will make its closest approach (perihelion) to the Sun. But backyard astronomers aren't the only ones interested in Comet Hartley 2.

NASA has redirected its *Deep Impact* space craft to fly past Comet Hartley 2 and take some pictures and data. The spacecraft will come within 1000 kilometres of the Comet and should be able to gather some additional data to help us understand the nature and origin of comets.

If the name *Deep Impact* sounds familiar, that's because it is the popular moniker given the NASA mission that fired a missile into Comet Temple 1 in 2005. The objective of that mission was to blast some material out from the comet and analyze it via spectroscopy and photography. Having shot its one missile half a decade ago, *Deep Impact* will simply do a little comet gazing via cameras during its rendezvous with Hartley 2.

The comet was discovered by Malcolm Hartley in 1986 using the Schmidt Telescope Unit at Australia's Siding Spring Observatory. It is a small comet with an estimated diameter of 1.2 to 1.6 kilometres. Hartley is also a short term comet with an orbital period of just 6.5 years. That means that its orbit takes it just out past that of Jupiter, then it swings back in towards the Sun. Interesting that its orbit is controlled by the gravitational tug of the two largest objects in our solar system.

Comets are frequent interlopers in our solar system. These remnants from the solar system's birth frequent a distant area surrounding our solar system called the Oort Cloud. Occasionally they will be perturbed by a passing star and begin drifting in towards our Sun. Some will eventually be caught in an orbit that takes them from our Sun out past Jupiter. With frequent trips around our Sun, they melt and/or their orbits are altered which either pulls them into the Sun or Jupiter. Either way, they perish.

John Crossen

Fall 'n' Stars 2010

Opening rocket launch. Photo by Mark Coady.

Another successfull fall 'n' stars star party was recently held on the weekend of September 17th to the 19th. I was the chair of the organizing committee this year and was kept busy for a few months making sure it would be a fun event for everyone. Brett Hardy was the lone PAA member to join me this year but he promises to be back.

No Fall 'n' Stars can start without a ceremonial rocket launch. Kevin Kell of Kingston RASC provides the rocket. After the successful launch and retrieval of the rocket it was time to set up our telescopes —including my new Celestron Nexstar 8SE and Kingston RASC's massive 24 inch Dobsonian.

Friday night's observing session was quite spectacular. Despite the fact that the moon had gone beyond first quarter there was much to see in the way of craters and mountains on and near the terminator. As well, there was a shadow transit of Ganymede across the face of Jupiter. As this moon approached Jupiter it stopped looking like a little star and was resolved into a disc. With its shadow clearly showing on the surface, Ganymede, for a while, made Jupiter look like it had acquired a big pimple.

Saturday morning there was solar viewing and a rather large swap table. Kingston RASC was helping the family of the late Norm Wellbanks dispose of his equipment. I managed to secure a nice and compact 12 volt power supply and a set of Williams Optics Binoviewers complete with two 20mm wide angle eyepieces and Barlow lenses. From another attendee I managed to score a pair of Coronado solar observing binoculars.

Saturday afternoon there were presentations in the longhouse. I was up first

continued on next page

continued from previous page

with a presentation on the growth of dark sky preserves in Canada and how to go about getting one designated. Doug Angle from Kingston RASC followed with an informative presentation on the most influential astronomers throughout history.

There is also an astrophotography contest where attendees are given ballots to vote on the best astrophotograph on display in the longhouse. The ballots are counted after dinner and the prize awarded which this year was an Olivon Planetary Imager.

Following a group photo there was the legendary catered banquet in the longhouse. This is the best and most bountiful of banquets of any star party. It still only costs $20—where other star party banquet costs have risen—and seconds were still free.

After dinner a draw was held for a new Celestron Firstscope 76mm tabletop Dob as well as a 50/50 draw. These draws help keep the cost of Fall 'n' Stars down to a level where the weekend costs less than half what the next up level of star party costs. Then door prizes were handed out with everyone receiving at least one. A grand prize of a 114 mm Bushnell tabletop Dob was won by Belleville RASC and fellow PAA member Joanne Burns.

With Saturday evening being clouded out some people left to go home while others gathered in the longhouse for a bit of ragchewing which is the best thing about this star party—meeting new friends and renewing acquaintances with older ones.

It has been said that Fall 'n' Stars is the best kept secret in the astronomy hobby. Next year, why not come out and discover why it's good to go to a smaller star party. I'll be there, for sure.

By Mark Coady

Kingston RASC's 24 inch scope.

Mark's setup.

Mark's new toys.

Laser Pointers

New Regulations from Transport Canada

LASER POINTERS ARE EXCELLENT educational and presentation tools that are available to all of us these days, but they are not toys and should never be treated as such. I would suggest they be treated with the respect of a firearm. Many of the same safety rules apply:

1. Treat every laser as if it were "loaded" (active with batteries installed)
2. Never point it at anything you do not intend to illuminate (accidents don't just happen, they are caused)
3. Always point a laser in a safe direction, whether "on" or "off"
4. Do not put your finger on the "trigger" until you are ready to use the laser

Be a responsible laser user. Practice safe use, whether doing an indoor presentation with a low power model or outdoors with the more powerful models. Last month our club was sent a letter and package of brochures from Transport Canada about safe laser pointer use, or Directed Bright Light (DBL) sources and the legal responsibilities that come with their use, especially "directed" at aircraft and aviation issues. I was relieved to see that there are still currently no restrictions on power levels or licencing that had been rumoured in recent years because of abuses by some individuals.

Rick Stankiewicz

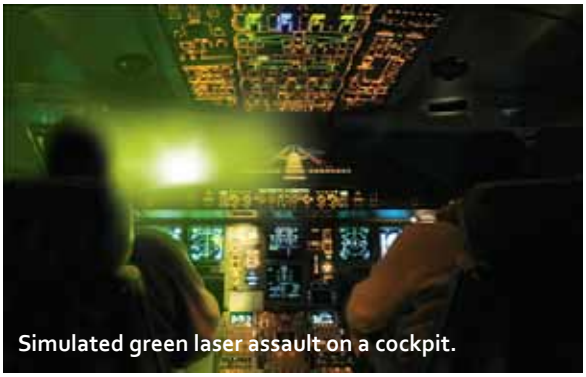
Those of us who use green lasers responsibly for public outreach are now going to pay a steep price for those few who deliberately shine them at aircraft. Transport Canada, with the assistance of police departments and other government agencies, is going to fully enforce provisions within the Aeronautics Act to combat the improper use of green lasers. Those convicted of deliberately shining a green laser into an aircraft cockpit will now face a maximum fine of $100,000 and/or imprisonment for up to five years.

Astronomers planning on using green lasers in areas of navigable airspace—most of Southern Ontario—will now have to fill out an application form "NOTICE OF PROPOSAL TO CONDUCT OUTDOOR LASER OPERATION(S)". The form is available at the following link: http://www.tc.gc.ca/wwwdocs/Forms/26-0754_0910-01_BO.pdf

Astronomers and others who operate green lasers without permission from Transport Canada will now risk being charged under the Aeronautics Act, as well. There is even a form available called "DIRECTED BRIGHT LIGHT ILLUMINATION INCIDENT REPORT/QUESTIONAIRE" where pilots and others can report green lasers at this link: http://www.tc.gc.ca/wwwdocs/Forms/26-0751_0908-01_BO.pdf

Can the day be far off where we see an outright ban on the use of green lasers?

Mark Coady


Simulated green laser assault on a cockpit.

Meet the lovely Andromeda

—in about five billion years

As we shift our astronomical gears into October some new players are rising in the east. One of my favourites is Messier object M45, also known as the Seven Sisters of the Pleiades.

This misty patch is readily visible with the naked eye from a dark-sky location. Turn your binoculars on it and the ladies of the night put on a nice fireworks display. M45 is a relatively new cluster of stars, maybe only 50,000 years old and at 440 light years distance, they are quite bright.

Also rising with the girls is Auriga, the charioteer. No, they're not fooling around together. But if you have trouble spotting the Seven Sisters, use the bright star Capella in Auriga to find them. They're located about two and a half fist-widths to the right of Capella and almost level with it. Capella is the top star in Auriga and very bright, so it's a tough one to miss. A star chart from *NightSky Magazine*, as usual, is helpful to any newbies out there.

Jupiter continues to rule the night sky as far as planets go. The big fella is well up by sunset in the east-southeast. It's the largest planet in our solar system and has not only been under attack recently from asteroids, but is currently missing its Southern Equatorial weather belt. Two astro-imagers have photographed the asteroid impacts—one on video—and it and the missing weather belt will be noticed through even a small telescope.

Current thinking is that the missing belt isn't missing at all but has been clouded over by ammonia rising up from beneath it. Given that Jupiter is classified as a "gas giant" planet, this is most likely the reason for the disappearing act. It has happened before and the weather belt did become visible within the year.

Uranus is also up and is currently the next-door neighbour of Jupiter. You'll need a telescope to see it, but it can be resolved at about 90 power. Poor old Uranus is the butt of many jokes and was at one time called Herschel after its discover, William Herschel and George who was the King of England and Herschel's employer. Eventually the name Uranus was chosen so that it would fall in line with the other planets which bear the names of the Greek gods. Uranus by the way was the father of Saturn and is credited with creating the universe.

The Seven Sisters. No matter how many times I see them, the Seven Sisters never fail to impress. They are big, bright and beautiful—worth picking up some binoculars to view.

Nighthawks (a.k.a. insomniacs) can watch Orion rising in the east in the wee hours after midnight. It will also be preceded by Taurus the bull along with a nifty grouping of stars called the Hyades and the bright star Aldebaran.

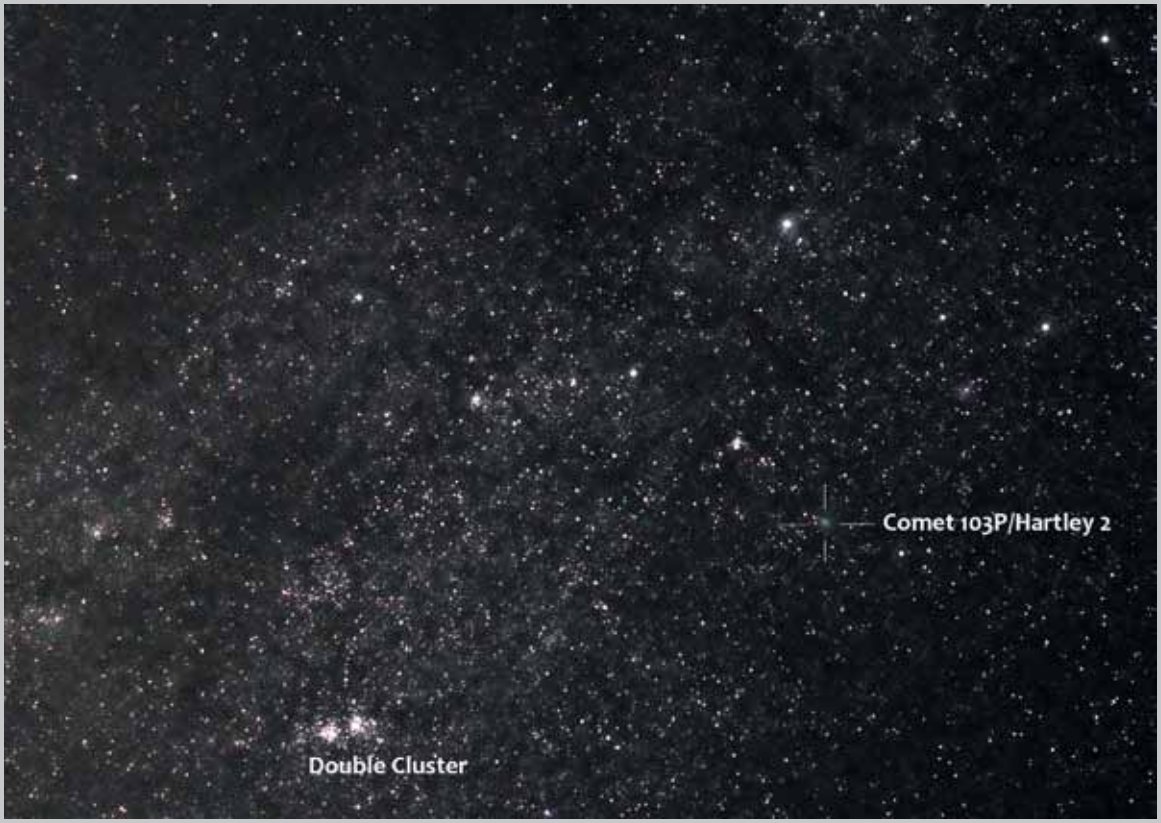
As dawn approaches Mercury and Venus put in their appearances. After that you should be snoozing.

Until we meet again by the backyard telescope, keep those yard lights aimed and dimmed down.

John Crossen

PHOTO GALLERY

Comet 103P/Hartley 2



On Sunday, October 3, I was out in the countryside taking advantage of crisp clear skies and no moonlight. I knew that Comet 103P/Hartley 2 was making its way through Cassiopeia so I decided to take a few photographs. I especially want to present this one as it shows a very small circular green fuzzblob east of Cassiopeia (below it in the photo). By October 7 and 8 the comet should be about 1° from the Double Cluster.

The photo was a stack of two 1 minute exposures at ISO 1600 using a Nikkor 50mm f/1.4 AI lens set at f/2.8 on a Nikon D200 DSLR camera mounted on an AstroTrac guiding platform.

Photo by Phillip Chee

Close Encounters—of the Jovian Kind

On September 20th at midnight, just two days before the Fall Equinox, we had clear cool skies to see not only a near full view of our own natural satellite (the Moon), but to the south east was Jupiter shining as the next brightest object in the night sky. This was the closest that the largest planet in our solar system was going to be to Earth for another twelve years (2022)! It was actually 75 million km closer to us at this point than it normally gets when we pass each other every 13 months. This is due just to the fact that our orbits around the Sun are slightly elliptical, so it takes longer to repeat similar passes than if we were in circular orbits. This time also marks Jupiter's "opposition" to the Sun (opposite it as they rise and set from the vantage point of our horizon on Earth).

I could not resist the lure of another astrophoto, so I set up my tripod and digital camera and using only my 70–300mm zoom lens, I zoomed in at 300mm and captured the following images from the deck in by backyard south of Peterborough, near Keene. Five moons in one night! These images are cropped and enlarged to 100% of their original format, but I still marvel at what anyone can image with nothing more than a DSLR camera and tripod. Sure the disk of Jupiter is over exposed, but its four largest moons are clearly visible in their usual "strung out formation" as they whirl around their host planet. From left to right this night, there is Europa, Io, Ganymede and Callisto. There are actually another 59 moons around Jupiter that we cannot really see from your backyard, but the four you can see are all roughly the size of our Moon. Now given that both these images were taken with the same photo equipment, consider this, our Moon is roughly 380,000 km away from us and Jupiter's moons are 630 million km from us! I think it is amazing that we have the technology to see and capture things that 400 years ago Galileo could not have dreamed of.

I hope you take advantage of this time of year to see some of the amazing sights that await you in the night sky, like five moons in one night. Pretty cool, but then the temperature is dropping too.

For those that are interested, the image of Jupiter's moons was shot at f/5.6, for 1/40 second, on ISO 400. The Moon was at f/5.6, for 1/1,000 second, on ISO 200.

Photos by Rick Stankiewicz

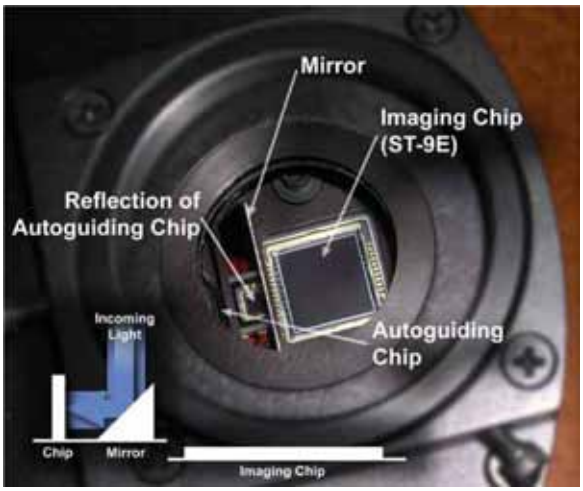
Misadventures of an Aspiring Imager

Adventure #8—A Slight Detour

At this point, if you recall, I have setup and balanced my telescope, and been able to actually focus my camera, despite the vagaries of "seeing" and miscellaneous other challenges. The next task that I tackled was autoguiding.

There are options in the methods you may want to choose to accurately guide your scope while imaging. As usual, a big factor in your decision is cost (as in all things to do with imaging !!!). The ultimate is to purchase a top of the line mount ($10,000 plus) which, if set up properly, will guide quite accurately for a number of minutes, especially if you are using a short focal length scope. At the other extreme, a reasonably priced mount that will track accurately for short intervals (up to 1 minute or so), which is just fine for most wide angle or planetary shots, or for many deep sky objects where you can stack (i.e. merge) many short exposure shots. And then there's the middle of the road option, which is to use a guiding imager coupled with computer software in order to track using a suitable guide star. This is the choice that I made.

The components you'll need will include an imaging camera, a guide scope, guiding software and a computer. It is possible to avoid the purchase of the guiding scope and imager by selecting one imager that is capable of doing both, as it includes two CCD chips within the one camera body (SBIG is one example). This will likely be cheaper, and has the very large benefit of saving weight—and hence a smaller mount. An often quoted disadvantage is that this limits the field of view from which to select a guide star; I personally have had little problem with this, but sometimes you have to fiddle around a bit.

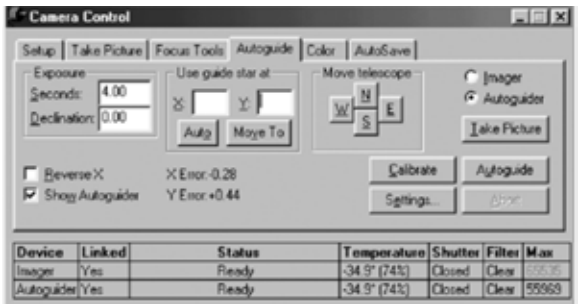


One issue that is glossed over in the autoguiding literature is the centering of your target image in the camera's field of view. This can be a problem as your main and guide scopes are both attached to cameras, so you have no easy way of previewing the image. This, in my not so humble opinion, is a major issue—and it's all to do with mount balancing—believe it or not. I will use my own experience as an example. When I first setup my scope I would align with an eyepiece, then carefully exchange the eyepiece for the camera. The only catch is that the camera, along with cables, etc, weighs significantly more than the eyepiece, so you now have an out-of-balance situation, which causes all sorts of problems. Just in case you are wondering, it is not practical to balance the mounts in between using the eyepiece and camera, as you will then be totally out of alignment. I played around with attempts to use counterweights along with the eyepiece, but this was very

continued on next page

continued from previous page

tricky as you need to balance in both RA and Dec directions. Some people use a flip mirror diagonal affair with both the eyepiece and camera mounted, but this adds loads of weight. Another alternative is to align using the imager and a field of view panning program, as is included with CCDWare PemPro, but this can be very slow unless you are initially close to alignment. In the end I decided to add a cheap 80mm light refractor scope aligned with my main telescope—this does add some weight, but does work well.



As mentioned, the guiding is performed with the aid of software linked to the guiding camera and to the mount. There are many packages available; the one I use is Software Bisque's CCDSoft, as it was provided free with the camera. To my knowledge all packages work in basically the same way. First, a calibration process is required so that the software gets to know the characteristics of your mount, scope, and guiding camera; then a guide star is selected, tracking started, and after a stabilization period imaging can start. All of this is relatively straightforward if, and it's a huge if, all the previous steps in setting up your installation have been performed properly. This will be the moment at which you rapidly discover that (1) your mount is not stable, (2) the scope is not polar aligned properly, (3) you have not focused properly, etc, etc, etc. If you encounter problems please read the previous seven chapters in this "adventure."

Next issue I'll continue with more misadventures, including:

- backlash really hurts
- what the heck is PEC
- why I am becoming a computer geek
- being colour blind doesn't help
- digital developments
- and I thought curves was all about beautiful women and fast cars
- keeping things in balance and sharp
- presenting the snaps to the world
- and what makes it all worthwhile

Stay tuned, John Galle

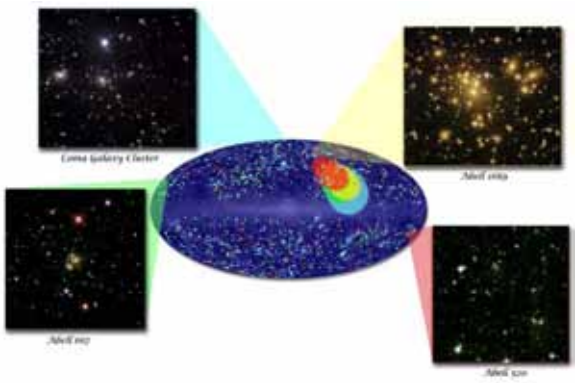
Dark Flow

The Biggest Mistake Since the Geocentric Era?

Dark Flow is force that is pulling the universe in a single direction toward the Centaurus/Hydra constellation. The speed that we are supposedly moving is two million miles per hour by either "The Great Attractor" or the gravitational pull of another universe.

When I reviewed Dark Flow, I found a significant problem or two, or *cough* (five).

1. We should not be able to view this as there is no stationary object to put into comparison. Meaning we are the only galaxy cluster not moving out of seven-hundred.
2. The direction that we are moving in is actually the most red-shifted part of the sky. Meaning that out of seven-hundred galaxy clusters, we are the only ones moving away.
3. The Great Attractor theory is nice, but ludicrous. The gravitational pull weakens as an object gets farther away, it does not stay the same; as shown in nearly every single law of physics.
4. Multi-universe gravitational pull theory or whatever is very, very wrong. For a start, there is no such thing as multi-universes, only parallel; and they're still a hypothesis, let alone philosophical.
5. For some coincidental fact, the movement of the Milky Way/Local Group, the Sun, and the Earth (yes, it is great enough to include) add up to a whopping total of very nearly two-million-miles-per-hour.

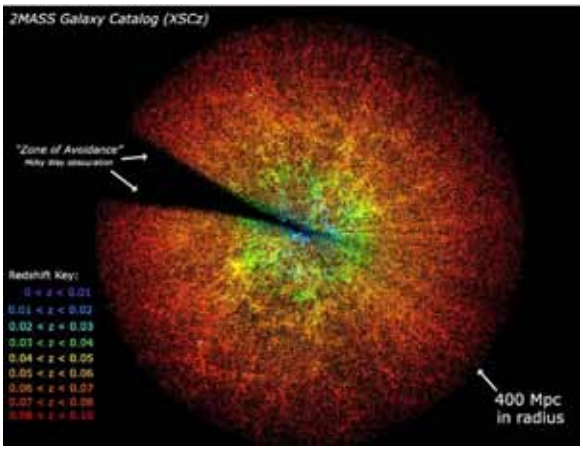


This will all be explained in a more in-depth explanation.

Problem One: Recording Dark Flow

Imagine you are in a pitch black dark room and on an elevator, but you don't know that because it's dark and you can't feel the motion of the elevator. Now put another elevator beside you with a dim enough light not enough to light the room, but enough to see. What happens? Do you see the light moving? Do you see anything happen to it? No, because you also moving with it. It's like the rotation of the Earth; you wouldn't know your moving, unless you had something to compare with.

Now your elevator stops, but the elevator with the light keeps on going. You are seeing the light move away from you and getting dimmer and dimmer and dimmer. This is the exact same thing, only with 700 other galaxy clusters[1] with some located 6,000,000,000ly away[2]. This shows us that the galaxy clusters are moving and the Local Group is not, why? This is later explained in problem five.



Problem Two: Red-Shifted vs. Blue-Shifted Objects in Dark Flow Theory

I discussed this problem with Sara Poirier once at the Ontario Science Centre last August, and we both agreed, there was something fishy about this. A study of

continued on next page

continued from previous page

the sky revealed a map of objects that are red-shifted and those that are blue-shifted[3]. The farther an object, the more red-shifted it was, due to Dark Energy. But, the area of the sky that was slightly more red-shifted was the direction of the Dark flow. On the other side, you could observe that it was more red-shifted. These results indicate that we are not moving with the Dark Flow, but away from it. Go to problem five for an in-depth conclusion.

Problem Three: If I had to Use One Word to Sum up Great Attractor Theory, it would be "Ludicrous"

The Great Attractor Theory says that the cause of Dark Flow is due to Abell 3627[4]. When astronomers took a second look at Abell 3627, they found that it was much more massive than it previously was thought.

In nearly every single equation, theory, and law that uses gravity indicates that it decreases with the farther away you are from it. Dark Flow theory shows that the speed is constant, not variant. Also, the galaxy cluster does not even have enough gravitational pull to even move us one inch toward it. The astrophysicists say that there is a more massive part of it behind it and outside the observable universe for the astronomers to observe.

Problem Four: Multi-Universe Gravity Theory is an Insult to Relativity

It seems that another insult to science is done up by this theory that somehow found itself published in a scientific journal. This theory states that the Dark Flow is caused by the tug of a larger universe which pulls us toward it[5].

Wrong. The theory is child's play in science. For one thing, THERE IS NO SUCH THING AS MULTI-UNIVERSES, not even quantum gravity accepts it; parallel, maybe, but no multi. When I speak of quantum gravity, I mean that string theory, loop quantum gravity, and the third to be theory does not accept it; this information is from the professors themselves of the Perimeter Institute[6].

Ok, let's say there is multi-universe for a second. Now hyperspace, or Minkowski space, the empty space between universes, does not have gravity. Gravity is described by General Relativity as shown in the Einstein Field Equations:

$$R_{\mu\nu} - \frac{1}{2} R g_{\mu\nu} = 8\pi G T_{\mu\nu}$$

where $R_{\mu\nu}$ is the Ricci curvature tensor; R is the scalar curvature tensor; $g_{\mu\nu}$ is the metric tensor; G is Newton's gravitational constant and; $T_{\mu\nu}$ is the stress-energy tensor.

As far as I know, there is no Euclidian space in Minkowski space, not allowing any tensors to take place in Minkowski space. This then breaks down the laws of conservation, not allowing gravity at all. This discussion could go on to Special Relativity, but I think it needs to end here before someone starts getting dizzy.

Problem Five: Coincidence, I Think Not; Comparing Our Velocity with Dark Flow

The speed of Dark Flow is supposed to be nearly 2,000,000 mph. When I compared that to the speed of the Milky Way/ Local Group, M, the Sun, S, and the Earth, E, I got a fantastic number. Let me show you:

See "Dark Flow" on page 14

continued from page 13

Dark Flow

$$\frac{2{,}000{,}000\text{mi}}{\text{hour}} = \frac{3{,}218{,}688\text{km}}{\text{hour}} = \frac{53{,}644.8\text{km}}{\text{minute}} = \frac{894\text{km}}{\text{second}} \approx M + S + E$$

$$= \frac{627\text{km}}{\text{second}} + \left[\frac{251\text{km}}{\text{second}} - \left(\left[\frac{\frac{251\text{km}}{\text{second}}}{360^\circ}\right][345^\circ - 285^\circ]\right)\right] + \left(\frac{30\text{km}}{\frac{\text{second}}{2}}\right)$$

$$= \frac{627\text{km}}{\text{second}} + \frac{209\text{km}}{\text{second}} + \frac{15\text{km}}{\text{second}} = \frac{851\text{km}}{\text{second}} < \frac{894\text{km}}{\text{second}}$$

$$\frac{894\text{km}}{\text{second}} - \frac{851\text{km}}{\text{second}} = \frac{43\text{km}}{\text{second}}$$

With a number so close to 894 km/s, it is very nice to say that the movement is caused by the Earth, the Sun, and the milky Way/Local Group.

What of the Galaxy Clusters' Movement?

Their movement was in cause of us. It's like when you're in a car driving. When you look outside you see all the buildings and scenery move in the opposite direction as you. When doing some research, it can be concluded that we are actually moving toward the Cepheus/Cassiopeia direction.

What Was Causing the Red-Shifting?

The red-shifting was our movement. With this information, it is easier to decide and narrow down our direction in which we are going in the universe.

In the future, I am going to use this information for my 2011 Science Fair project and mentored by Sara Poirier. Hopefully this information will get published after the fair. So think of this as an intro to the new reason of what causes Dark Flow. If you have any questions or queries, please do not hesitate to email me at benjaminamorgan@hotmail.com. I especially want the ones that can try to debunk my theory.

1. http://www.nasa.gov/centers/goddard/news/releases/2010/10-023.html
2. http://www.nasa.gov/centers/goddard/news/topstory/2008/dark_flow.html
3. http://web.ipac.caltech.edu/staff/jarrett/XSCz/pview.html
4. http://imagine.gsfc.nasa.gov/docs/ask_astro/answers/990924a2.html
5. http://news.discovery.com/space/dark-flow-universe.html
6. Three Roads to Quantum Gravity (2001) by Lee Smolin of Perimeter Institute.

The Sky this Month

Mercury is at superior conjunction on the 17th. Morning sky early in the month and then not visible afterwards.

Venus rapidly falls into early evening twilight in the western evening sky and is at inferior conjunction on the 29th.

Mars is low in the early western evening sky in Libra and passes into Scorpio later in the month.

Jupiter visible most of the night and just past opposition. Nearing retrograde at the Aquarius-Pisces border.

Saturn in conjunction with the sun on the 1st and reappears in dawn twilight at end of the month.

Moon 3° N of Venus on the 9th. The Pleiades 1.2° N on the 1st.

Autumn Equinox arrives at 7:28 a.m. on the 25th.

Zodiacal Light visible for the next two weeks from the 5th in the eastern morning sky.

Draconid Meteors peak on the 8th.

Moon Phases

Last Quarter	11:52 PM	September 30
New Moon	2:44 PM	October 7
First Quarter	5:27 PM	October 14
Full Moon	9:36 PM	October 22
Last Quarter	12:46 PM	October 30

What I Did on My Vacation: Part 2

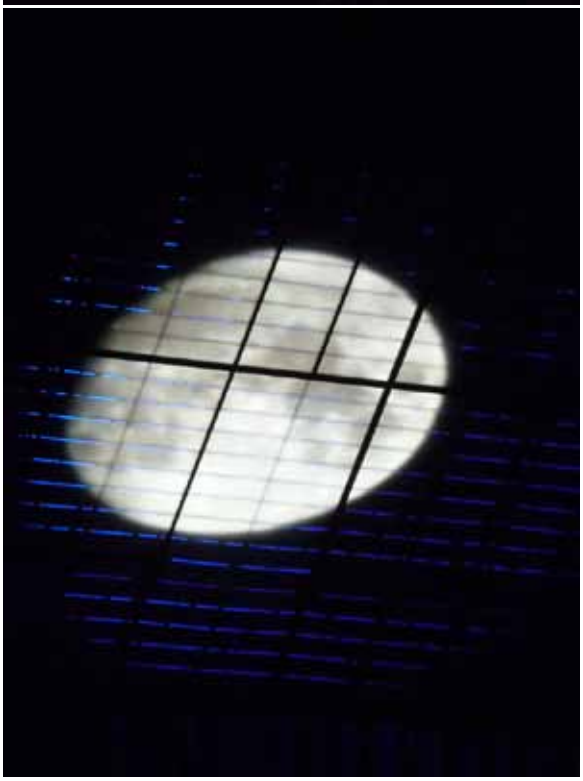
In the last issue of *The Reflector* I had a story from my annual spring fishing trip up north. Well, to continue on my theme of vacations and something astronomical. I have to tell you about my trip to Ottawa on July 25th. My daughter and I went to a concert at Scotia Bank Place to see Sting (sans Police) on one of only 4 Canadian stops of his world "Symphonicities" tour. It was fantastic (if you like Sting, which I do), but what made it novel for me was that he was touring with the Royal Philharmonic Concert Orches-

tra. It was a fair sized 45-piece symphony orchestra (as you can see from the one image) and worked very nicely to Stings classic pieces that span over 30 years. So what does this have to do with astronomy, you ask? Well, some of the lyrics of course and part of the show. Like the classic, *King of Pain*, starts with, "There's a little black spot on the sun today,

"It's the same old thing as yesterday..." (not all that appropriate until recently, now that the sunspots are back)

Then when they did, *Moon Over Bourbon Street*, with, "There's a moon over Bourbon Street tonight...

"...And you'll only see me walking by the light of the moon...," they actually projected a full Moon over the stage (see other image).



It's true; I just cannot go anywhere without some sort of astronomical connection, but this is half the fun, the other half is sharing it.

Your concert going astronomer,
Rick Stankiewicz

continued from page 1

Astro2010

and today we know of around 470 extrasolar planets, ranging from about 4 times to 8000 times the mass of Earth.

This explosion in extrasolar planet discoveries is only set to get bigger, with a NASA mission called *Kepler* that was launched last year. After staring at a single small patch of sky for 43 days, *Kepler* has detected the definite signatures of seven new exoplanets, plus 706 "planetary candidates" that are unconfirmed and in need of further investigation. *Kepler* is likely to revolutionize our understanding of Earth's place in the Universe.

We don't yet have the technology to search for life on exoplanets. However, the infrared Spitzer Space Telescope has detected molecules that are the basic building blocks of life in two exoplanet atmospheres. Most extrasolar planets appear unsuitable for supporting life, but at least two lie within the "habitable zone" of their stars, where conditions are theoretically right for life to gain a foothold.

We are still a long way from detecting life on other worlds, but in the last 20 years, the number of known planets in our Universe has gone from the 8 in our own Solar System to almost 500. It's clear to everyone, including the Astro2010 Decadal Survey team, that the hunt for exoplanets is only just beginning, and the search for life is finally underway in earnest.

Explore Spitzer's latest findings at `http://www.spitzer.caltech.edu`. Kids can dream about finding other Earths as they read "Lucy's Planet Hunt" at `http://spaceplace.nasa.gov/en/kids/storybooks/#lucy`.

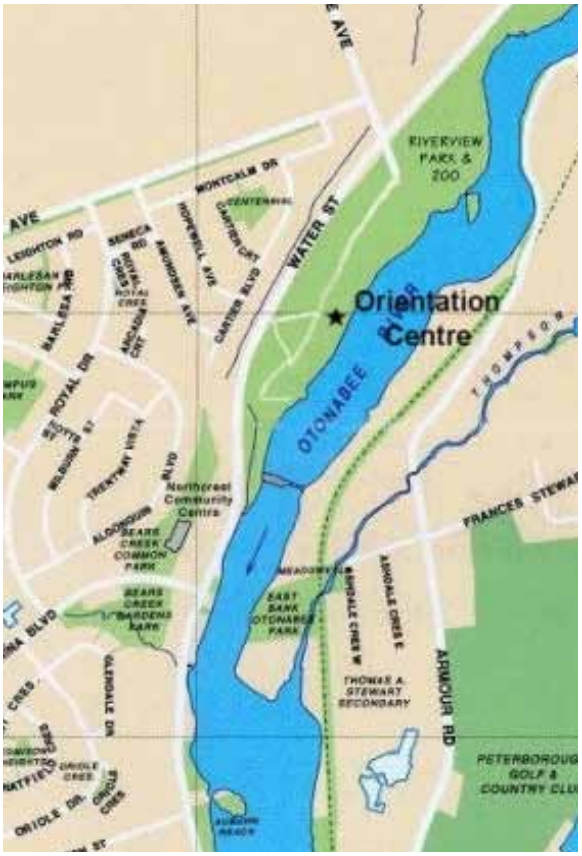
This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

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:
October 25, 2010



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 p.m.. P.A.A. executive business will be conducted starting at 7:30 P.M. Members and the public are welcome to attend the earlier time.