

## Editorial

It's warm at last! April showers are over, now if only we can keep the clear skies. Our PAA Astronomy Day is coming up and we can still use more helpers. Listed below is some information on upcoming events. Hope to see you there!

### Mini-Star Party

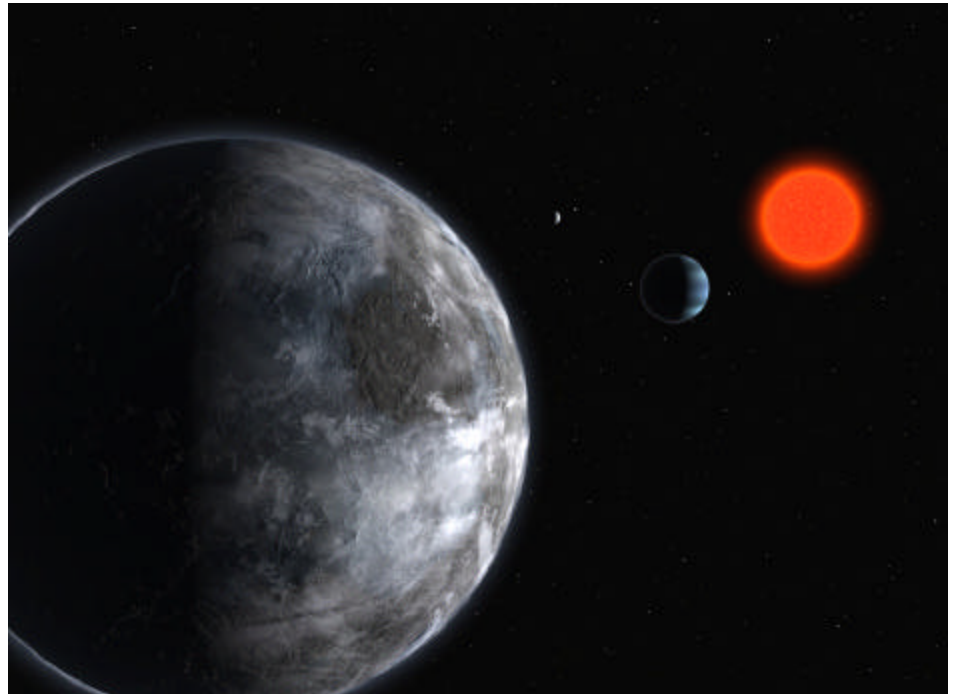
John Crossen is hosting a mini-star party at Buckhorn Observatory on the May long weekend from Friday May 18 to Monday May 21. Accommodation is strictly camping in the tent of your choice. The house will be open for bathroom breaks. Hydro will be available for those who need it. The cost is \$10 per person to offset the cost of hydro, etc.

Contact John Crossen or Mark Coady if you are interested at 705-657-2544 or johncstargazer@aol.com for John or 705-292-0458 or mark.coady@sympatico.ca for Mark.

### Astronomy Day

Our local Astronomy Day is Saturday May 26th at the Peterborough Centennial Museum and Archives on Armour Hill next to the Liftlocks. We need people on hand to help set up and tear down, to man solar scopes, be able to answer questions from the public, to talk about how they got into the hobby, and to have their scopes on hand in the evening.

Contact Mark Coady if you can help at 705-292-0458 or mark.coady@sympatico.ca



Earth-sized planet orbiting nearby star Gliese 581. Image credit: ESO

## Earth-Like Planet Found Nearby

Well, the planet is not exactly a neighbor in our solar system, but at 20.5 light-years away in the constellation Libra, it's the closest scientists have found yet!

This exoplanet (the term used by astronomers for planets that orbit other stars) is 14 times closer to its star, Gliese 581, than the Earth is to our Sun and completes a full orbit in 13 days.

You might think this planet is burnt to a crisp, but in fact, it is the complete opposite! The star Gliese 581 is a red dwarf, meaning it is smaller, cooler, and less luminous than our Sun. The planet may be a lot closer to its star, but it lies in the habitable zone and may even have liquid water!

For more information go to: <http://www.eso.org/outreach/press-rel/pr-2007/pr-22-07.html>

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## The Planets Will Invade Your Backyard In May

Venus, Mercury, Jupiter, Saturn and Mars will soon hop over the hedge and into your night sky. Venus and Mercury will be visible in the western sky just after sunset.

Mercury will make its best showing of the year, glowing brightly from about 20 degrees above the horizon towards the end of May. Mercury will also be quite bright, going from -1 magnitude to 0 between May 3 and the end of the month.

Venus, too will put in a spectacular showing during May. Its brightness rivals that of Sirius, the brightest star visible from the Northern Hemisphere. The reason for the planet's brightness is the fact that its dense cloud cover reflects 60% of the Sun's light. The Moon, even in its full phase, only reflects about 11% of the Sunlight.

At sunset, Saturn will be in the southwestern sky. You can find it just in front of the large sickle-shape arrangement of stars that make up Leo's head. If you have a telescope, you'll only need about 30X to make out its rings. And at 120X

they're quite spectacular. See if you can make out the Cassini Division in the rings. It's the dark band that marks a large gap in the multitude of rings that orbit the planet.

Jupiter will rise later in the evening, around 11:00. The jovial giant will be in the constellation Ophiuchus which rises in the east-southeast. Those with a steady hand and a pair of 10X by 50mm binoculars should be able to detect Jupiter's moons Io, Ganymede, Europa, and Callisto.

Last up for the night is Mars. It pops over the eastern horizon about dawn. It will be in the process of passing from Aquarius (the water bearer) to Pisces (the fish). Look for Mars low in the east-southeast just before sunrise. Here's what else is up in May:

**May 2** at 6:09 a.m. brings the Full Moon and washes out the starry sky just like you were in Toronto.

**May 5** the Eta Aquarid meteor shower peaks just before dawn. If you happen to be in the southern latitudes, you may get a good show before the Moon rises.

**May 9** Venus passes 1.7 degrees north of the centre of the star cluster M35 in Gemini. Grab your binoculars and let

Venus be your guide to the gorgeous star cluster.

**May 10** brings the Last Quarter Moon and with it a string of good nights for Moon-free stargazing.

**May 16** the Moon is between Earth and the Sun. That means New Moon, or no Moon, so stargazers own the night.

**May 22** the dark edge of the waxing Moon will occult (pass in front of) Saturn. This should be a fascinating binocular event.

**May 23** brings with it the First Quarter Moon and we'll all be inside watching television come May 31 when the Full Moon washes out the night sky.

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## Aloha#13 – Canada-France-Hawaii Telescope (CFHT)

This is the last in my series on the giant telescopes on Mauna Kea, Hawaii. It has been over a year since my wife and I traveled to the Big Island of Hawaii to see the famous observatories, but the memories are no less vivid. I am finishing the tour of the summit, with the Canada-France-Hawaii Telescope (CFHT). This facility is the one of interest to most of us because we are likely most familiar with it. Here are a few things that you might not be aware of though.

The CFHT saw first light in 1979, which makes it one of the oldest of the thirteen facilities on the mountain, (two others are older and two others were also first operational in 1979). As the name implies, this facility involves a truly international cooperative and is the oldest one of its kind on Mauna Kea (since 1974). Located at the 13,793-foot level (4,204 m), this 38 m (125 ft) high observatory houses a 3.6 m (12 ft) diameter

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The planets are out in force in May. Saturn and Jupiter are stunning. Later this summer Mars rules the night sky. Photo by Buckhorn Observatory.



*A close-up at last light, with the silhouette of the island of Maui and the Haleakala volcano, in the background.*

mirror that is 0.6 m (2 ft) thick. This 250-ton telescope operates in both the optical and infrared spectrum. In 1979, this telescope had the sixth largest mirror in the world, but since the 1990's, the new generation of 8 to 10 meter (26 to 33 ft) mirrors have changed its status so that it must now compensate for the relatively small size of the mirror in its research efforts. One way that the CFHT has done this is by optimizing its wider field of view that the larger telescope doesn't have. This has been evident since 2003, when it first started to use of the MegaPrime imager and the MegaCam camera. This might be the biggest camera in the world, when you consider that each image would fill a 700 megabyte CD. In other words, each image is covering an area larger than four full moons (18,448 X 18,432 pixels). This is over 340 megapixels and a far cry from the 10 megapixels that you get in a high-end digital camera these days!

The CFHT has been leading the field in studies of asteroid belt objects, their moons, binary relationships, masses and densities. These are some of the smallest bodies in our solar system, but some of the most potentially threatening to Earth. This facility also has five different instruments to do spectroscopy in both the optical and infrared range. This allows for detailed analysis of stars and galaxies

for temperature, chemical composition and velocities. Other work by the CFHT involves studies of comets, Kuiper Belt objects, black holes and a Redshift survey to measure distance, speed and directions of galaxies.

The control centre for the CFHT is not located in Hilo, like most of the other telescopes on Mauna Kea, but rather in the little community of Waimea (or Kamuela), near the huge Parker Ranch (at 150,000 acres, it is one of the largest ranches in the whole of the U.S.A.), located at the north end of the Big Island. The Keck Telescopes are the only other facilities also controlled from this same location (just down the road from each other). This is about 22 mi. (35 km) from the mountaintop telescope. The view of Mauna Kea from Waimea is amazing on a clear day, even at this distance. There is not really a visitor's centre for the CFHT like there is for Keck I & II. There was a small lobby with a few nice images and a large-scale model of the actual CFHT. I was able to purchase a few calendars that are produced annually and are illustrated with deep space images taken with the CFHT. They are stunning calendars and I was able to buy a few different years too. There was limited free literature though (federal cutbacks I'm sure). This is a

must see stop on any astronomy tour to the Big Island of Hawaii.

This wraps up my observatory tour series of Hawaii. I hope you have enjoyed the trip to the top of Mauna Kea to see one of the world's best observatory sites and the multitude of facilities that inhabit this unique environment. Until next time, Mahalo!

**Canada France Hawaii Telescope :**

[www.cfht.hawaii.edu/](http://www.cfht.hawaii.edu/)

[http://www.ifa.hawaii.edu/mko/telescope\\_table.htm](http://www.ifa.hawaii.edu/mko/telescope_table.htm)

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## Shooting Marbles At 16,000 mph

NASA scientist Bill Cooke is shooting marbles and he's playing "keepsies." The prize won't be another player's marbles, but knowledge that will help keep astronauts safe when America returns to the Moon in the next decade. Cooke is firing quarter-inch diameter clear shooters – Pyrex glass, to be exact – at soil rather than at other marbles. And he has to use a new one on each round because every 16,000 mph (7 km/s) shot destroys his shooter.

"We are simulating meteoroid impacts with the lunar surface," he explains. Cooke and others in the Space Environments Group at NASA's Marshall Space Flight Center have recorded [the real thing](#) many times. Their telescopes routinely detect explosions on the Moon when meteoroids slam into the lunar surface.

A typical flash involves "a meteoroid the size of a softball hitting the Moon at 27 km/s and exploding with as much energy as 70 kg of TNT."

"Mind you," says Cooke, "these are estimates based on a flash of light seen 400,000 km away. There's a lot of

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*Death of a shooter. This is a real photo of a pyrex marble exploding on impact at the NASA Ames Vertical Gun Range. Photo credit: Peter Schultz, Brown University, and NASA*

uncertainty in our calculations of speed, mass and energy. We'd like to firm up these numbers."

That's where the marbles come in....

Cooke is using the Ames Vertical Gun Range at NASA's Ames Research Center in Mountain View, CA, to shoot marbles into simulated lunar soil. The firings allow him to calibrate what he sees on the Moon. His work is funded by NASA's Office of Safety and Mission Assurance.

"We measure the flash so we can figure out how much of the kinetic energy goes into light," he explained. "Once we know this luminous efficiency, as we call it, we can apply it to real meteoroids when they strike the Moon." High-speed cameras and a photometer (light meter) record the results.



*A 30cm-diameter crater plus spattered dust are all that's left after a test shot in the Ames Vertical Gun. Photo credit: NASA.*

The Ames Vertical Gun Range was built in the 1960s to support Project Apollo, America's first human missions to the lunar surface. The Ames gun can fire a variety of shapes and materials, even clusters of particles, at speeds from 0.5 to 7 km/s. The target chamber usually is pumped down to a vacuum, and can be partially refilled to simulate atmospheres on other worlds or comets.

Equally important, the gun's barrel can be tilted to simulate impacts at seven different angles from vertical to horizontal since meteors rarely fly straight into the ground. Black powder propels the marble, and special valves capture the exhaust gases so they don't blow away the impact crater.

Cooke's experiments are being run in two rounds. The first set of 12 shots in October 2006 fired Pyrex glass balls into dust made from pumice, a volcanic rock, at up to 7 km/s. Follow-up experiments will use JSC-1a lunar simulant, one of the "[true fakes](#)" developed from terrestrial ingredients to mimic the qualities of moon soil.

Knowing the speed and mass of the projectile will let Cooke to scale the flash and estimate the energies of the softball-size meteoroids that hit the Moon at up to 72 km/s, more than six times the speed of the Ames gun. But luminous efficiency is just part of the question. A lot of the impact energy goes into shattering and melting the projectile -- the main reason for using glass rather than metal -- and then spraying debris everywhere.

"The ejecta kicked out from an impact can travel hundreds of miles," Cooke continued. "We need to know more about that if we are going to live on the lunar surface for months at a time." Because the moon has virtually no atmosphere to slow down flying debris, particles land with the same speed that launched them from the impact site.

So you might dodge a bullet but still get caught by its shrapnel. And the question is, Are you more likely to get cut off at the ankles by debris spattered

along the horizon, or hit from above by material on high, ballistic trajectories?

To gauge that danger, Cooke will measure the speed and direction of secondary particles by the sheet-laser technique. Lenses and mirrors spread a laser beam into paper-thin sheets of light so flying particles are briefly illuminated several times. The light traces then tell the size, direction, and speed of debris particles leaving an impact.

The technique requires a lot of image analysis, but it is cleaner and more accurate than the older way of hanging aluminum sheets in the chamber and counting holes.

The answers will help determine the kinds of shielding needed on exploration vehicles protecting humans where every day is for "keepsies."

Submitted by: Mark Coady  
Author: Dave Dooling  
Credit: [Science@NASA](mailto:Science@NASA)



*The Ames Vertical Gun Range. Photo credit: NASA*

## Clear Skies Get Buckhorn Observatory Off To A Fast Start

A string of clear nights midway through April had BHO speeding along in high gear early in the year.

On Thursday night, the 19<sup>th</sup> a group of 20 students and teachers arrived from Adam Scott Collegiate and Vocational School. It was a real credit to the school bus driver that she managed to negotiate our driveway without a mishap or getting stuck. Adam Scott always does well at the Regional Science Fair, so these weren't your average "hey dude" kids.

Everyone managed to fit into the observatory and we were off on a tour of the universe complete with the double galaxies M81 and M82, Saturn with its beautiful rings, Venus in its gibbous phase, and the star clusters M5, a fabulous globular that rivals M13 and M35, one of the best open clusters. The students also had a look at the Whirlpool galaxy and we discussed galactic interaction. The conversations eventually lead to parallel universes and other subjects



*It always amazes me how many people are interested in astronomy and wander over to check out the pictures on the display board. Here I'm being asked if I repair telescopes. Both the people I'm talking to in the photo above have scopes that need a little TLC. I make certain they leave with a BHO schedule and a light pollution brochure.*

that are more conjecture than anything, but still fun to imagine and talk about. Like I said, these kids were real keeners.

The next couple of nights BHO hosted about 15 more guests from the Peterborough area, the Westwind Inn and Bowmanville. The sky targets remained the same as the previous night with the kids from Adam Scott, with a bit of the Moon now available on Sunday night. I always enjoy cranking the power up and watching people "fly" over the Moon using the telescope's hand paddle.

The next Thursday night was a cloudburst, but the evening's astronomy activities were indoors at the Buckhorn Public School. This time we were part of a fund raising night for the school. It was a great evening for the school with local businesses represented and putting on sampling events for the assembled crowd. Deb won two draws over the course of the night, and I was able to connect with the school's new Principal. A number of resort owners drifted over to my display to see if I would be interested in bringing the telescope over to their resort for a pay-as-you-peek observing session when the guests start arriving. In fact I'm already booked for one weekend in May. Happily it's not our astronomy weekend, the 26th.

So we're off and running again. Here's hoping the weather will cooperate. I've got three nights booked in May with the Scouts and another planetarium session at Queen Elizabeth School in Peterborough. Plus the new observatory addition will be arriving soon. I'll have more on that bit of excitement when the big package arrives. Meanwhile I must be the busiest retired guy around. Cheers and clears to all.

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## Blue Moons Are As Scarce As Hen's Teeth

The month of May will feature two full Moons according to some calendars. That's because different calendar makers will either use the Eastern Time Zone for North America as their basis for the date the full Moon will fall on, or Universal Time which is the new name for Greenwich Mean Time. Only the name has changed. Universal Time is still based on Greenwich Observatory in England. The new name is simply more correct as it applies the same clock to the entire world. We're just one big time zone.

Let's say your calendar shows a second full Moon for May and June. What's all this got to do with the Moon turning blue? Nothing actually, but the phrase is taken literally by some people.

The phrase "that only happens once in a blue Moon" is just a colourful (pun intended) way of saying that something is a rare event. Scarce as hen's teeth and a cold day in hell are other ways of saying the same thing. Hopefully none of

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*Want to see a blue Moon? Then get your Crayons out. The term has been linked to the second full Moon in the month for years. That's because it is a somewhat rare event. The Moon won't really turn blue no matter what you've read or heard in the media. Photo by Gord Rife of Schomberg, ON.*

you are taking your chickens to the dentist or packing a warm coat in Uncle Fred's casket – just in case.

There have been a few actual blue Moons in history. When there is one, it can usually be attributed to volcanic eruptions that fill the upper atmosphere with dust and smoke on a world wide scale.

Then, and only then, you might see a blue Moon because the atmospheric contaminants are absorbing the red light waves and in doing so seem to tint the Moon blue. Prairie fires and forest fires can do the same thing.

According to Canadian astronomer and author Terence Dickinson, the term "once in a blue Moon" has been around for over 400 years. Until recently it was just another way of saying that something was a rare event. "...and that'll be the day when the Leafs win the Stanley Cup," is another excellent example.

But that all changed in 1985 when the originators of Trivial Pursuit picked up the term and its incorrect definition from a children's book. The book was never popular, so despite the fact that the information was incorrect, it never became accepted as fact via that particular medium. Trivial Pursuit, on the other hand became a world-wide phenomena. Along with the game's rise to global popularity, the incorrect information about blue Moons also became a brand new urban legend.

Today you'll hear about the blue Moon on the news, in the weather reports, and on some talk shows. But that's all it is – talk. When there is a second full Moon in a month, it will look just the same as the first one did – chalky white. Then again, Mount Etna did erupt again today, so maybe we will get a blue Moon courtesy of the debris in the air. If so, that's the only reason the Moon will appear blue.

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## NASA Space Place

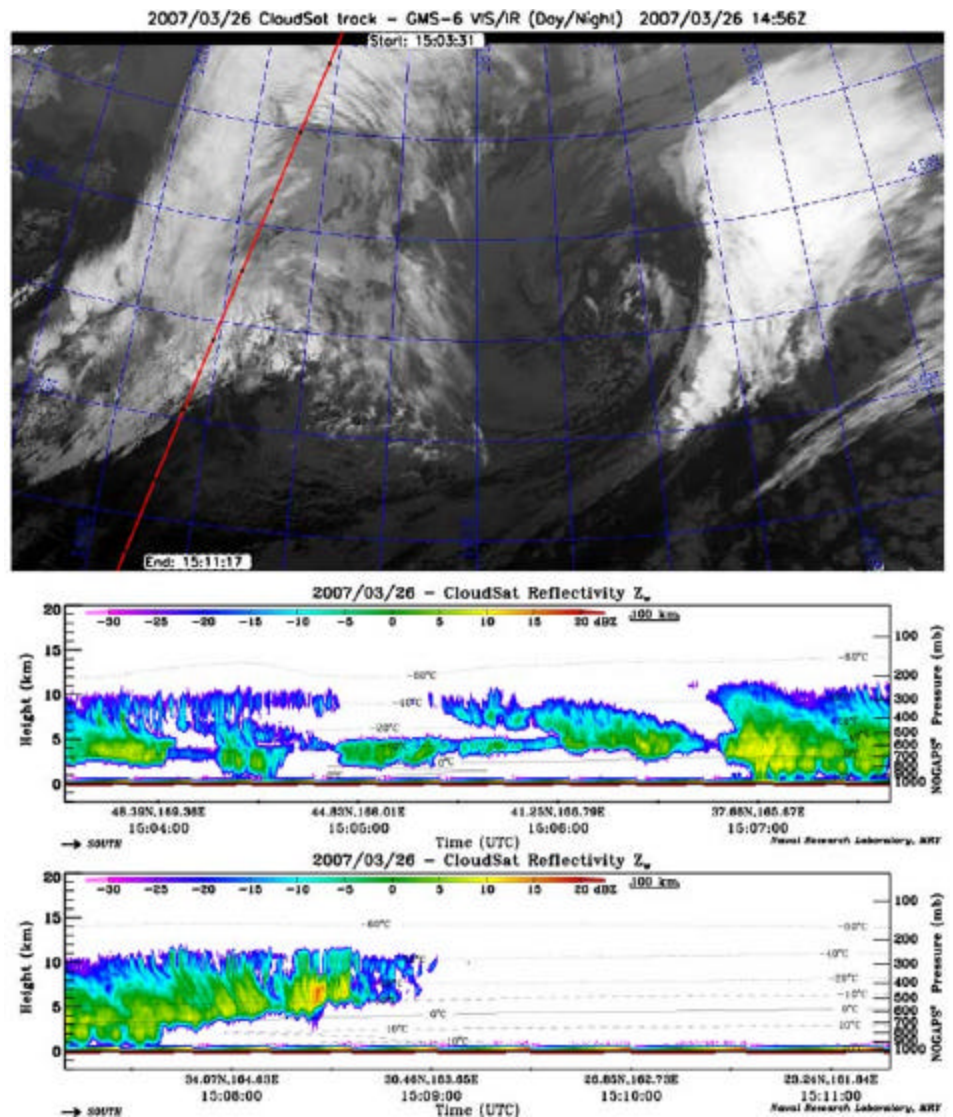
### Clouds from Top to Bottom

During the summer and fall of 2006, U.S. Coast Guard planes flew over the North Pacific in search of illegal, unlicensed, and unregulated fishing boats. It was a tricky operation—in part because low clouds often block the pilots' view of anything floating on the ocean surface below.

To assist in these efforts, they got a little help from the stars.

Actually, it was a satellite—CloudSat, an experimental NASA mission to study Earth's clouds in an entirely new way. While ordinary weather satellites see only the tops of clouds, CloudSat's radar penetrates clouds from top to bottom, measuring their vertical structure and extent. By tapping into CloudSat data processed at the Naval Research Laboratory (NRL) in Monterey, CA,

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A CloudSat ground track appears as a red line overlaid upon a GMS-6 (a Japanese weather satellite) infrared image. CloudSat is crossing the north-central Pacific Ocean on a descending orbit (from upper-right to lower-left) near a storm front. The radar data corresponding to this ground track (beginning in the center panel and continuing into the lower panel) shows a vertical cloud profile far more complex than the two-dimensional GMS-6 imagery would suggest. Thicker clouds and larger droplets are shown in yellow/red tones, while thinner clouds are shown in blue.

Coast Guard pilots were better able to contend with low-lying clouds that might have otherwise hindered their search for illegal fishing activity.

In the past, Coast Guard pilots would fly out over the ocean not knowing what visibility to expect. Now they can find out quickly. Data from research satellites usually takes days to weeks to process into a usable form, but NASA makes CloudSat's data publicly available on its QuickLook website and to users such as NRL in only a matter of hours—making the data useful for practical applications.

"Before CloudSat, there was no way to measure cloud base from space worldwide," says Deborah Vane, project manager for CloudSat at NASA's Jet Propulsion Laboratory.

CloudSat's primary purpose is to better understand the critical role that clouds play in Earth's climate. But knowledge about the structure of clouds is useful not only for scientific research, but also to operational users such as Coast Guard patrol aircraft and Navy and commercial ships at sea.

"Especially when it's dark, there's limited information about storms at sea," says Vane. "With CloudSat, we can sort out towering thunderclouds from blankets of calmer clouds. And we have the ability to distinguish between light rain and rain that is falling from severe storms." CloudSat's radar is much more sensitive to cloud structure than are radar systems operating at airports, and from its vantage point in space, Cloudsat builds up a view of almost the entire planet, not just one local area. "That gives you weather information that you don't have in any other way."

There is an archive of all data collected since the start of the mission in May 2006 on the CloudSat QuickLook website at [cloudsat.atmos.colostate.edu](http://cloudsat.atmos.colostate.edu). And to introduce kids to the fun of observing the clouds, go to [spaceplace.nasa.gov/en/kids/cloudsat\\_puz.shtml](http://spaceplace.nasa.gov/en/kids/cloudsat_puz.shtml).

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

By Patrick L. Barry

## First Holy Cross Science Fair Was A Real Mind Opener

The physicist Richard Fynman was once told by an artist friend that scientific minds couldn't really appreciate the beauty of a flower because they immediately turn the flower into a series of interdependent life systems. The physicist's response to his friend is one of those magical moments that Velcroed itself to my brain.

Fynman replied that the esthetic beauty of the flower was not lost on him. His understanding of science also gave him another view of the plant's beauty. To Fynman the inner workings

of the flower were as beautiful as its appearance. The structure and repeated patterns of the plant were as magnificent as its colour. The intricate systems that drew water from the soil and pumped life-giving nutrients through the flower's veins rivaled its delicate shape in appeal. And the fact that it filtered CO<sub>2</sub> out of our atmosphere and replaced it with Oxygen was a beauty we can appreciate with each breath we take.

So, when I was asked to be one of the judges at the recent Holy Cross Science Fair, I looked at it as the opportunity to be the judge of a beauty contest. The beauty in this case was watching young minds learn the basics of scientific thinking and the value of experimentation and repeatable results.

On the day of the fair I was immediately loaded down with a clipboard full of papers to fill out as I made the rounds of my assigned science projects. My first impression was how fascinating and relevant to the real world the projects were.

The students' experiments and studies were based on everyday activities like how talking on a cell phone impacts on a driver's concentration, the affect of nicotine on living organisms such as flat

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*Congratulations to all the students who participated in the first Holy Cross Science Fair. Your work was outstanding. A special salute goes out to science teacher Monica White who spearheaded the project.*

worms, foods that offer natural protection to bacteria, an investigation of Sudden Infant Death Syndrome, and how boys and girls did or didn't differ in their perception of optical illusions. Not only were the students delving into real-world scientific situations and solutions, they were also learning the basics of scientific thinking, the pure logic in which all theories must be judged. The fair also emphasized creativity and communications skills. After all, the greatest idea isn't worth a thing if its originator can't communicate it to the rest of the world.

It was a treat to see the students' work and to talk with them about where it might lead them. That "next steps" phase is also an important stage of scientific thinking. In the case of these students, the immediate next step is that the winning experiments will go on to the Peterborough Regional Science Fair which (by the time you are reading this) was just held at Trent University.

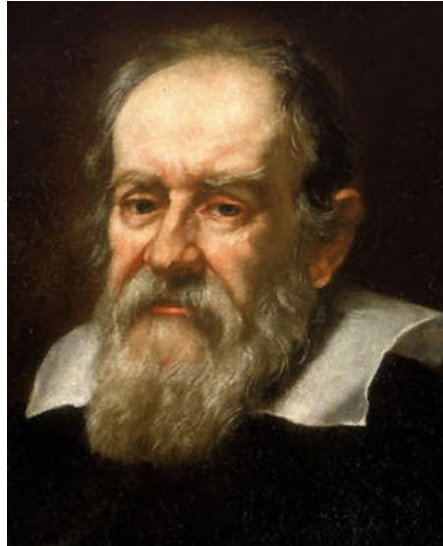
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## The Downfall Of Humanity Began With Galileo

Ever since astronomy became a science, the human race has been going down hill. Four hundred years ago Earth was the centre of the solar system. The Sun, Moon, planets and stars revolved around us. We were the centre of the cosmos – as we knew it.

Then along came Nicolaus Copernicus with the idea that the planets orbited around the sun. Galileo Galilei could see proof of this by observing the moons of Jupiter as well as the phases of Mercury and Venus with the newly invented telescope.

Suddenly we were no longer the centre of everything. Instead we were just one of the six known planets, swinging around the Sun. But at least the Sun was the centre of the cosmos and we were orbiting around it – well, not for long.



*Perhaps the greatest scientist of all time, Galileo Galilei set the ground work for many to come. The sight of Jupiter's four inner moons confirmed the idea that we orbited the Sun. His work with gravity was the key to that of Newton. He was the first man to observe sunspots with a telescope via eyepiece projection. And his lunar maps were the first of their kind.*

In more recent history we came to see that our Sun was just one of billions others that make up our galaxy. We call them stars, but they are made of the same stuff as our Sun and radiate heat and light due to the same process – nuclear fusion. So Sun or star, they're both the same.

With that bit of insight, our status in the cosmos was diminished another step. We're certainly not at the galactic core. Instead, our Sun and solar system live in some nameless suburb in the fourth arm of the Milky Way without even a McDonalds nearby.

By the 1930's we became aware of the fact that our galaxy wasn't the end-all and be-all of the universe either. Fritz Zwicky realized that there were thousands of other galaxies – many of which were in clusters. Edwin Hubble found that most galaxies were moving away from us. And the further away they were, the faster they were moving. Bingo. Not even our galaxy was special anymore.

Today we know that our galaxy is only one of an estimated 100 billion. Our Sun is just one of about 5 billion trillion. And our planet is one of a very uncertain, though probable, trillion or more. Recently the Hubble Space Telescope took a 100 hour exposure of a section of the sky no larger than a grain of sand held at arm's length. Within that tiny chunk of the universe, the HST imaged thousands of previously unknown galaxies. Yikes, our importance is shrinking again!

In fact, the more we learn the smaller we become in terms of significance within the universe. And by the way, our known universe is seen as being about 13.7 billion light years across and expanding further as you read this.

So what's beyond that? Nobody knows. But as I tell children whenever I visit the schools, "you already know more than Galileo did. So it's your job to find out."

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## SOFIA Finally Flies

SOFIA – the Stratospheric Observatory for Infrared Astronomy – which features a 2.5 meter telescope mounted inside a reconfigured Boeing 747 jet, which once belonged to Pan Am, had its inaugural test flight on April 26<sup>th</sup>. After some more test flights, it will be based at the NASA Dryden Research Facility at Edwards Air Force Base in California. It is a joint project of NASA and the German Aerospace Center.

The entire project was on the chopping block at one time – in fact, it was axed – but was spared due to the fact that it is a relatively cheap way to do expensive astronomy.

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When fully operational in 2009 or 2010, it will fly at an altitude of 40,000 feet - far above most of our dense atmosphere. This will allow for excellent views of the heavens at a fraction of the cost of going into space to do the same, by housing it in a vehicle that can be regularly serviced, which is something you cannot do with a space based observatory.

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## The Conjunctions Just Keep On Coming!

April 19<sup>th</sup> was not quite like every other night this spring. After what seemed like months of rain and clouds we finally were getting some lovely clear evenings to stargaze and this evening was good timing for it. Yet again the planet Venus and a slender crescent Moon (with some "earthshine") were the "stars" of the western sky. Another showstopper conjunction took place. The accompanying images say it all. From about 7:20 until about 9:10 p.m. these two celestial bodies lit up the sky and many people (even non-astronomers) were taking notice. I got calls at home



from people that wanted to know "what was happening in the west"? It is amazing what an effect Venus has when accompanied by a sliver of Moon. The images here were taken with a tripod mounted digital (4 MP) camera. Give it a try some time. You don't need to have the fancy expensive equipment to capture celestial events. There have been several similar conjunctions over the last four months, but people are just never tire of a good thing, least of all me. Keep those conjunctions coming!

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## The Sky This Month

### MERCURY

Mercury is at superior conjunction on May 3rd. By mid-month it is best viewed in the west after sunset.

### VENUS

The "evening star" is dazzling viewers in the northern hemisphere as reaches its maximum altitude.

### MARS

Mars is found in Aquarius. The brightening red planet rises in the early morning hours, finally pulling out of the dawn glare.

### JUPITER

Jupiter is at opposition next month so it is visible most of the night. It rises earlier and earlier as May progresses. It is currently in Ophiuchus,

### SATURN

Quadrature is the best time to observe the planet through a telescope because the shadow cast by the planetary disc onto the rings is most pronounced. The rings are starting to close so don't delay in viewing this interesting event. Saturn is high above Venus in western skies at

sunset and at the end of the month is setting by midnight.

### URANUS

This distant gas giant is occulted by the Moon on 12 May. It rises about an hour after its neighbor Neptune. 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:

The waning gibbous Moon greatly hinders viewing the Eta Aquarid meteor shower on May 6th.

## TMB 40mm Paragon VS 35mm TeleVue Panoptic

Before launching into battle, this is a "from my eyes" article. No scientific tools were used for measurements. It's all eye-ball and point of view opinions. So anyone who wants to draw their own opinion is invited to drop in and check the new TMB out. It will impress you. Now let's get down to the battle of the eyepieces.

The TMB has a healthy edge on price and delivers a slightly wider apparent field of view (AFOV) due to its 40mm format. I'd be hard pressed to see the 2-degree difference between TMB which claims a 70-degree AFOV and the Panoptic which claims a 68-degree AFOV. The big difference here is in the power they generate in my 2800 mm focal length scope. With the 35mm Panoptic the scope was at 80X. The 40mm TMB dropped that to 70X, hence the wider field of view. And that wider field of view was one of the things I was looking for.

In my C11 NexStar, the Panoptic couldn't show the observatory's guests  
*Continued...*

Messier objects M81 and M82 in the same field of view. That's important to me because M81 is a face on galaxy and M82 is an edge on view. Having both in the same field of view allowed me to demonstrate the difference quite handily. Plus at 70x, the image size is still impressive, so that people aren't looking at near-invisible little smudges and wondering what kind of loon would pay big bucks to see...this?

Yet another area where the two eyepieces are near equals is ease of use. The TMB is a bit lighter which is of importance to Dob owners, and both eyepieces are quite friendly to the inexperienced observer. I've now had over 30 people through the observatory since acquiring the TMB and no one has had problems looking through the eyepiece. Almost all of them were first time scopers, and not once did I hear the dreaded, "I can't see anything..."

Both eyepieces deliver lots of eye relief with the edge going to the Panoptic. One thing I did find annoying about the TMB was its eyecup. It is quite stiff, and I was most comfortable with it folded down. So every time I cranked up the scope I had to roll it down using two



*The new 40mm TMB Paragon is a healthy chunk of glass that delivers excellent all-round performance in its 2-inch format. Eye relief is ample for eye-glass wearers and it would be unfair to call the views anything less than stunning.*

thumbs. If you want to put the eyepiece cap on tightly you have to roll it up, otherwise I'd just leave it in the down position. It's a niggler, but an annoying one to me. In cold weather that stiff eyecup could be a challenge to gloved hands.

As far as the optical performance is concerned, both are excellent. The TMB delivered pin-point star images from edge to edge in my F10, F8, and F6.5 scopes. Ditto the Panoptic. And I can say the same in terms of a nice flat field of view. No induced curvature.

To my eye, both eyepieces rendered superb high-contrast images on Saturn as well as the Moon. And that's quite amazing considering they were both multi-lens designs, made for low-power, wide-field galaxy scanning. Obviously the fully multi-coated optics transmits almost 100% of the light that passes through them to your eye.

Would I recommend that all you Panoptic owners switch to TMB's new 40mm Paragon? No, and here's why.

My quest for a slightly wider field of view was the prime motivator in the switch. The Panoptic is a superb eyepiece. I had mine for over 10 years and

if it was a stinker, it would have vanished over the back fence in a hurry. So there's no need for a yard sale.

But if you don't have a Panoptic and you'd like to move up to an eyepiece that's every bit its equal for a bunch less money, the TMB is my first recommendation. At \$250 USD it is just as good as my 35mm Panoptic and about \$130 USD less.

Since I purchased the TMB, TeleVue has introduced a 41mm Panoptic, so the AFOV battle is back to even. But that little rascal takes a \$510 bite out of your back pocket and a lot of explaining to the dear wife.

So in my eyes TMB is the winner, especially for anyone looking to move up to a top-notch piece of equipment without backing a dumpster-load of cash up to the check out line. And by the way, there's a 30mm TMB wide-field coming soon.

One final point that people seldom factor into a buying decision is resale value. I suspect that TeleVue with its years of marketing and outstanding quality reputation will continue to be a high-demand (also high-return) item on astro-buysell. I bought my Panoptic 35mm long enough ago that the \$340 CDN that I sold it for was almost equal to the cost when it was new. That is also just about an even swap for the new TMB when you factor in taxes, duty, and the exchange rate.

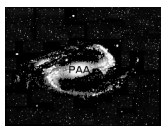
So thank you Mr. Thomas M. Back. And thank you Mr. Al Nagler. I am a very happy camper due to your remarkable optical designs.

John Crossen  
JohnCstargazer@aol.com

J O K E I J O K E I J O K E I J O K E I

It is not conclusive yet, but NASA believes the Mars Pathfinder has found proof of life on Mars. The CD player was stolen.

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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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## 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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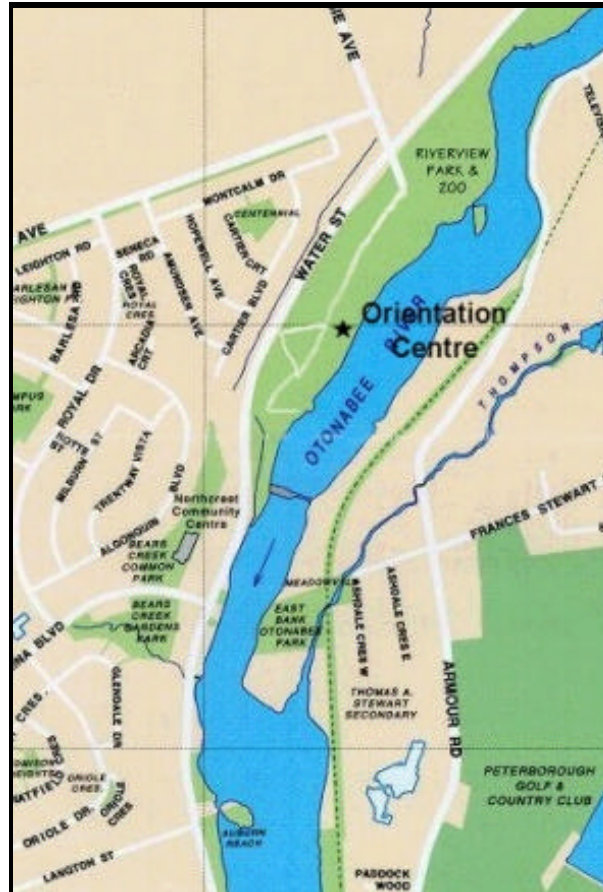
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**Please contact me first if you are sending a large file.**

**NEXT ISSUE'S  
DEADLINE IS  
May 15, 2007**  
☼

## 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**.



\*\*\*  
subject to change

### 1 CALENDAR OF EVENTS 1

- May 4, 2007                      General Meeting— Rene Bowe explains how to build a telescope
- June 1, 2007                      General Meeting— “Astrophotography” with PAA members\*\*\*

### 1 Moon Phases 1

Full Moon		May 2 & 31, 2007	June 30, 2007
Last Quarter		May 10, 2007	June 8, 2007
New Moon		May 16, 2007	June 14, 2007
First Quarter		May 23, 2007	June 22, 2007