PETERBOROUGH ASTRONOMICAL ASSOCIATION

The Reflector

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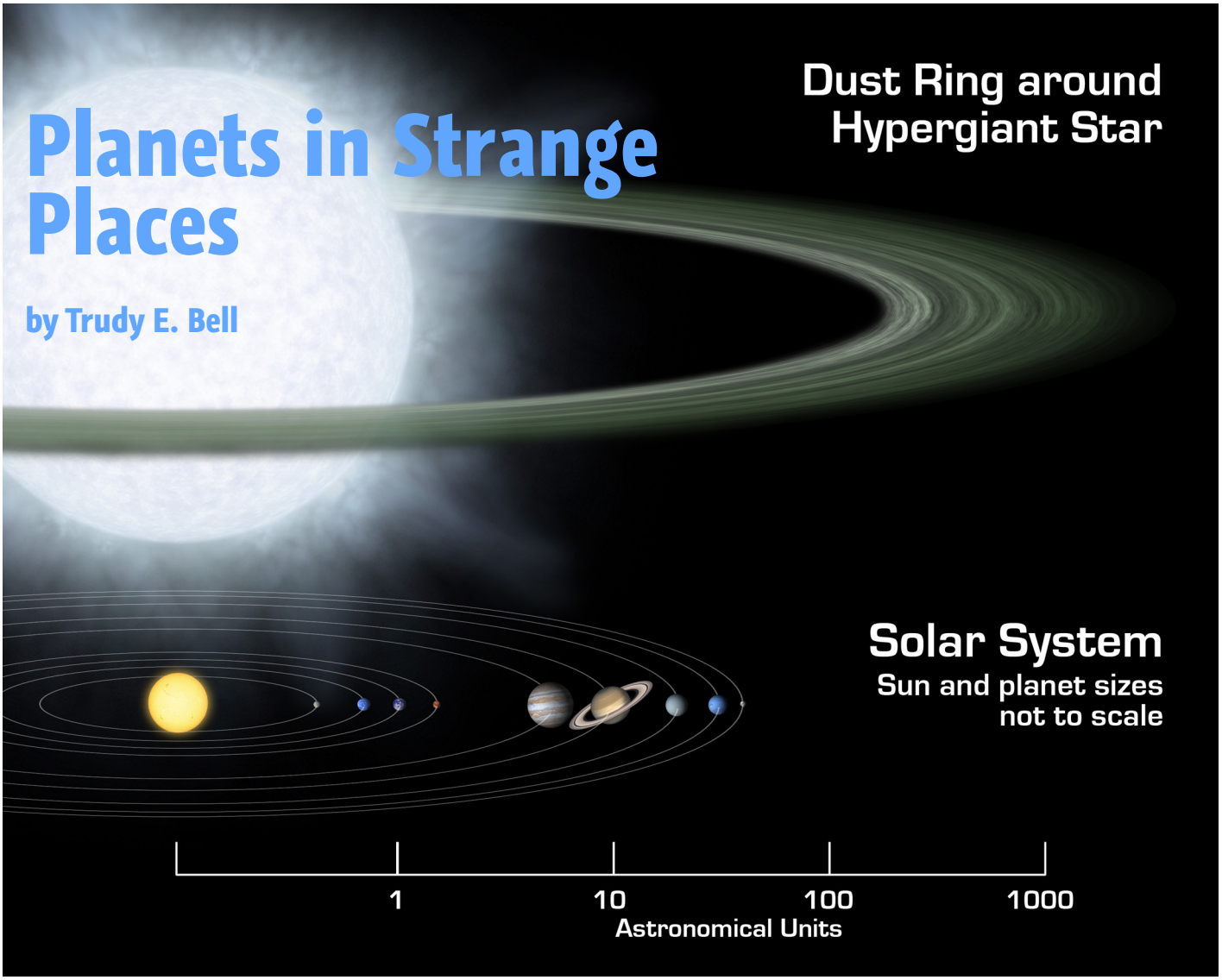
Planets in Strange Places

by Trudy E. Bell



Artist's rendering compares size of a hypothetical hypergiant star and its surrounding dusty disk to that of our solar system.

Red star, blue star, big star, small star—planets may form around virtually any type or size of star throughout the universe, not just around mid-sized middle-aged yellow stars like the Sun. That's the surprising implication of two discoveries in 2006 from the 0.85-meter-diameter Spitzer Space Telescope, which is exploring the universe from orbit at infrared (heat) wavelengths blocked by the Earth's atmosphere. At one extreme are two blazing, blue "hypergiant" stars 180,000 light-years away in the Large Magellanic Cloud, one of the two companion galaxies to our Milky Way. The stars, called R 66 and R 126, are respectively 30 and 70 times the mass of the Sun, "about as massive as stars can get," said Joel Kastner, professor of imaging science at the Rochester Institute of Technology in New York. R 126 is so luminous that if it were placed 10

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President's Message

Thinking Ahead

The New Year is well under way and so are we at the P.A.A. It is membership renewal time for the "old timers", so "Welcome back!" but I would like to also welcome those that have newly joined our ranks. Come out to meetings, come out to events, ask questions, get involved and take advantage of the privileges of your membership.

I trust you have all checked out our website to see the exciting line-up of events and presentations and speakers we have until next fall. This is a very good time to be into astronomy and a member of the P.A.A.

I hope some of you will be able to take advantage of the clear skies of winter to search for and find some of the "faint and fuzzy" objects that make up our galaxy and universe. You might find some words of encouragement and direction in this issue of *The Reflector*?

Never stop learning and keep bundled up and looking up!

Rick Stankiewicz
President

Letter from the Editor

Volume Ten

PHILLIP CHEE, EDITOR

Astronomy is a vibrant subject. If there's any doubt you just have to read the news, in print or online. This notion may owe much to human's space exploration efforts, the Internet, and science fiction. Already this year we've had some interesting news. We should be doubly proud of Kathryn Gray, the 10-year-old who has been credited as the youngest person to discovery a supernova (see page 15). Oh, and she's Canadian!

From the pages of science fiction, NASA's NanoSail-D finally unfolded. This solar sail powered satellite was launched in November 2010 and became the first solar sail vehicle to orbit the Earth (just 650 km above). But, this being the nature of space exploration, the sail got stuck during its deploymet. That is until January 20, 2011, when the sail unfurled all on its own, after scientists and technicians were mourning the failure of another mission. Which means you still have time to try and photograph the NanoSail-D before it plunges into atmosphere and flames out in April or May. Then submit your entry to the NanoSail-D photo contest: http://nanosail.org/ First prize is $500.

We should forgive Parke Kunkle, a Minnesota astronomer, for stirring the tempest in the teapot (in Sagittarius, of course!) He has re-ignited an ages old debate between astronomers and astrologers about the boundaries of the zodiac constellations and how the precession (wobble) of the Earth's axis has altered boundary dates of our horoscope symbols. http://voices.washingtonpost.com/blog-post/2011/01/new_zodiac_sign_dates_dont_swi.html It shouldn't be news as this argument resurfaces every couple years in the media, but at least it keeps astronomy in the public's eye.

So, I do hope you enjoy this month's *The Reflector* and we shall see you next month.

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.
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Glass Tiger Bassist Goes from Rock Star to Stargazer

JOHN CROSSEN

Scientists estimate that the Sun puts out more energy every second than North America uses in a year. But that energy output is puny when compared to the "go-power" of Wayne Parker, bass player for the 1980s rock band *Glass Tiger*. Wayne has been an amateur astronomer for years and it led to a new career as an astro-entrepreneur.

As gigs with the band wound down, Wayne started a company called SkyShed and introduced a series of prefabricated wooden backyard observatories with roll-off roofs. He then expanded his product line to include a POD or Personal Observing Dome and turned the world of backyard astronomy upside down.

Manufactured in Shallow Lake, Ontario, Wayne's original 7-foot diameter POD consisted of pre-formed polyethylene sections that could be nested for economical shipping. After they arrived they could be bolted together by two people with a wrench in an afternoon. When finished they provided the owner with a weather-tight, secure shelter for their telescope, computers and astronomical imaging devices. Just turn the key and all your gear was set up and ready to go. Plus they looked like observatories with a rotating dome. All I could say was cool! So I bought one.

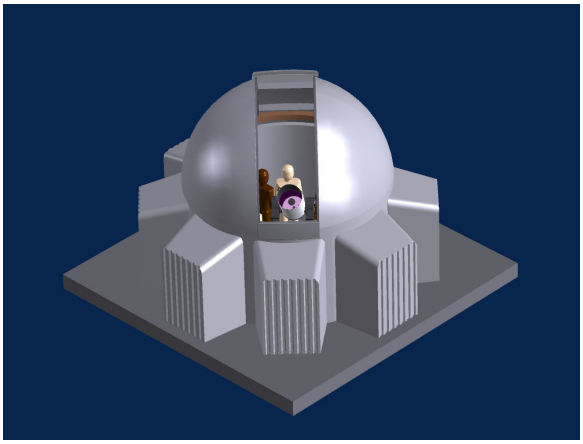
Today his factory pumps out about 50 units per week. In a hobby with a small core of ardent enthusiasts, that has made his company (now called SkyShed POD) the number one home observatory producer in the world. Now he's ready to grow again.

Called the POD MAX his new units are 12.5-feet in diameter and capable of comfortably holding up to eight people. The walls are 6 feet high, the dome rotates electronically and there are optional bays that can be adapted for equipment storage, computer setups, coffee machines, a small refrigerator...whatever you want to put inside.

The primary target groups for these larger units will be universities, community colleges and astronomy clubs looking for a permanent facility they can use for instruction and public outreach. The units will also appeal to well-heeled astro-imagers who require a larger space for bigger telescopes, electronic imaging equipment and computers.

Like the original POD, they will be very affordable when compared to any competing units. And because they are made with the same materials and techniques, they will be rugged and durable. But don't expect to set up your "PODzilla" with a few friends and a case of beer on the weekend. You'll need professional help, permits, approvals electricians and a solid foundation.

The first POD MAX units are expected to be rolling off to eager customers in 2012. And just like the original POD, the new POD Max will revolutionize astronomy. So start packing the pennies in the pig.



POD MAX BLUEPRINT. In addition to being made in Ontario there is an even more local connection to POD MAX. Two members of the Peterborough Astronomical Association have also been working with Wayne's design team. Yours truly is also helping design and test some new POD equipment for Kendrick Astro Instruments.

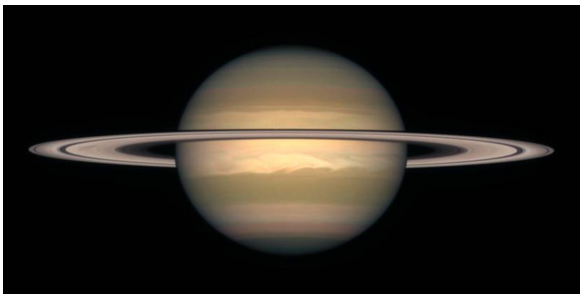
What's Up for February Stargazers

Saturn has been visible in the pre-dawn sky for a couple of months. JOHN CROSSEN

But for February the ringed thing puts on its first night showing at a reasonable hour. Rising at about 10 p.m. in February, Saturn will be brighter than last year. That's because the planet's rings will be tilted towards us a bit more.

Over the past couple of years the rings have been nearly edge-on from our point of view. Through a telescope the planet appeared more like an olive with at toothpick through it than the pretty pictures in books. The lack of tilt meant that the rings reflected very little sunlight in our direction. Happily that changes this year.

Saturn will accompany the constellation Virgo across the sky during the spring and early summer months. On April 3 Saturn will be at opposition. That means it will be directly opposite Earth and the Sun. You could draw a straight line through all three objects from the Sun out. It also means that on April 3 Saturn will be rising as the Sun sets and won't set until the Sun rises the following day.



Saturn. The ringed planet will rise around 10:00 p.m. in February. It's a great first-time target for new telescope owners. Look for it near the bright star Spica in the constellation Virgo. Terry Dickinson's *NightWatch* has great star charts and is available at Happenstance Books in Lakefield.

For those who like to connect the dots of the constellations, Orion and Leo will rule the February sky. Both are large constellations which are easy to define visually. Orion will be at his highest point to the south about 8:30 in the evening while Leo will be just leaping clear of the eastern horizon.

Moving more overhead will be the charioteer, Auriga and the twins known as Gemini. The autumn favourites of Perseus, Cassiopeia, and Andromeda will be sledding downhill in the western sky, soon to bid us farewell for the season.

February 5 at about 7:00 p.m. bright Jupiter will make a pretty conjunction in the western sky with the thin crescent Moon. At the same time Pegasus, the flying horse, will just be poking his nose, represented by the star Enif, beneath the western horizon. Good bye until next fall.

Uranus will still be quite near Jupiter and just visible as a blue dot in binoculars. Mars will be in conjunction behind the Sun so we won't be able to see it. Mercury and Venus will be predawn targets, but they will be very low in the sky.

That's what's up in February. All you neophytes who received telescopes for Christmas should figure out how to use them and be ready to catch your first glimpse of Saturn. It will be spectacular, even at low power.

Until we meet again by the backyard telescope, keep your outdoor lights aimed down and the stars up bright. You'll help preserve the beautiful night sky of the Kawarthas.

Three hundred sextillion stars —and counting

M82 Starbust Galaxy. Local Group Galaxy M82 is called a starburst galaxy because it is currently producing millions and millions of new stars. So the three hundred sextillion star count is increasing steadily. These stars are forming in tight-knit clusters and would be an incredible sight to any intelligent life observing them. Photo from NASA.

John Crossen

If I had a star for every time someone asked me how many stars there are I'd have a bunch, but not nearly as many as there really are. It's one of the more popular questions that pop up during a group visit to Buckhorn Observatory. I used to tell people that if you counted every grain of sand on every beach in the world, you'd run out of sand before you equalled the star count.

Today my fast answer is—more than you could imagine. I have read that there are more than 300 billion stars in our Milky Way Galaxy alone. Plus there are an estimated 400 billion more galaxies in the known universe. Hum, 300 billion times 400 billion, hey I was right! There are more stars than you or I can imagine. But as of December 1, 2010 that incomprehensible number may have become even more unfathomable.

The new estimate is 300,000,000,000 ,000,000,000,000. That's 300 sextillion stars but it's only an estimate—there could be more.

In a study published last December in the online journal of *Nature*, Yale University astronomer Pieter van Dokkum estimated that there were far more red dwarf stars in the universe than had been calculated. Red dwarfs are about one fifth the size of our Sun and are the most common types of stars in the universe.

Previous star estimates have been based on studies of our Milky Way Galaxy. And why not, it's the territory closest to home. But according to van Dokkum not all galaxies are the same.

After years of study using the 10-metre Keck Telescope in Hawaii to examine elliptical galaxies (the Milky Way is classified as a barred spiral galaxy) van Dokkum and his colleagues calculated that the ratio of red dwarf stars in elliptical galaxies is far greater than in spiral galaxies such as the Milky Way.

So, when you extrapolate the "new improved" number out into a universe where elliptical galaxies are quite common, the star count balloons. According

See "Starburst Galaxy" on page 14

Life on Mars can be good —you just have to get there

In the past more than 50% of the missions to Mars failed.

JOHN CROSSEN

NASA, THE RUSSIANS AND and the British have all tasted bitter defeat as their vehicles slammed into the planet, missed the mark completely or incinerated on the launch pad. At one point NASA even had a cartoon Martian gremlin posted in one of their facilities.

But there have also been some tremendously successful missions to the Red Planet. The first to come to mind are Opportunity and Spirit which touched down in 2004. The two rovers outlived their scheduled life span of 90 days by more than six years. Until last year when Spirit got stuck in a sand pit, the two rovers had worked in tandem photographing, collecting and analysing and rock samples and atmospheric data from two very different geographic portions of Mars. Even when stuck, Spirit continued to relay information and photographs. Just like the Energizer bunny, Spirit's mate Opportunity continues to carry on researching

MARS ODYSSEY. In addition to mapping the Martian surface the Odyessy Orbiter will be checking out possible landing sites for future missions to Mars – both robotic and manned. Artwork courtesy NASA/JPL

Not quite so familiar to the general public are the Mars Orbiters that have been sweeping around the planet. In the case of Mars Odyssey, it is still going strong after nearly 10 years of photographing the surface of the planet and recording seasonal changes in the weather. A decade's worth of weather data allows scientists to build more accurate predictions for the future when we Earthlings will be taking our first steps on our next neighbour out from the Sun. Mars Odyessy has served other key functions, too.

Since first orbiting Mars in 2001 it has given us the most detailed maps of the Martian surface ever made. It also acted as a data relay for both the Opportunity and Spirit Rovers. And it performed the same function for the Phoenix Lander which is credited with discovering water ice just beneath the dusty surface of Mars. I still remember the photographs of its scoop and the white patch of ice it uncovered from the Discovery Channel coverage.

Prior to Odyessy NASA's Mars Global Surveyor held the endurance record. It went into Mars orbit in 1997 and continued to relay data and photographs until 2006.

Since the Viking Landers first set down on the rock-strewn, desert-like surface of Mars in 1972, we have been tourists on the Red Planet. The first panoramic photographs the Landers sent back were mind boggling when you consider they were the first close-up views from a world millions of kilometres away. Later we would have the Pathfinder Rover to send us more post cards from the alien world.

There is, of course, more to come and Mars Odyssey will be part of it. In 2013 NASA will be landing a new mobile laboratory (Mars Science Lab) on Mars. MSL will be better equipped and faster than any of the earlier rovers, so it can explore more territory. Once again Mars Odyssey will act as a relay station for all the new information and photographs the new mission will be gathering.

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Close Galaxy Encounters Increase Star Production

JOHN CROSSEN

Gravity rules when it comes to forming galaxies, stars, planets and moons. And nothing puts gravity into action like galactic interaction. That was one of the key points delivered by Professor David Patton in a talk given to Trent University students and interested members of the public on Wednesday, January 19.

The focus of his talk centred on blue spiral galaxies—those with active star formation taking place, and red elliptical galaxies that are primarily devoid of the interstellar mater necessary for star formation. The colour of the galaxies had nothing to do with red shift/blue shift, rather the optical colour the galaxies present.

While the talk brought out the fact that close galactic encounters definitely stimulate star formation in blue spiral galaxies which have an abundance of interstellar material, a great deal of emphasis was placed on data refinements developed by Dr. Patton and a select team of colleagues from universities across Canada.

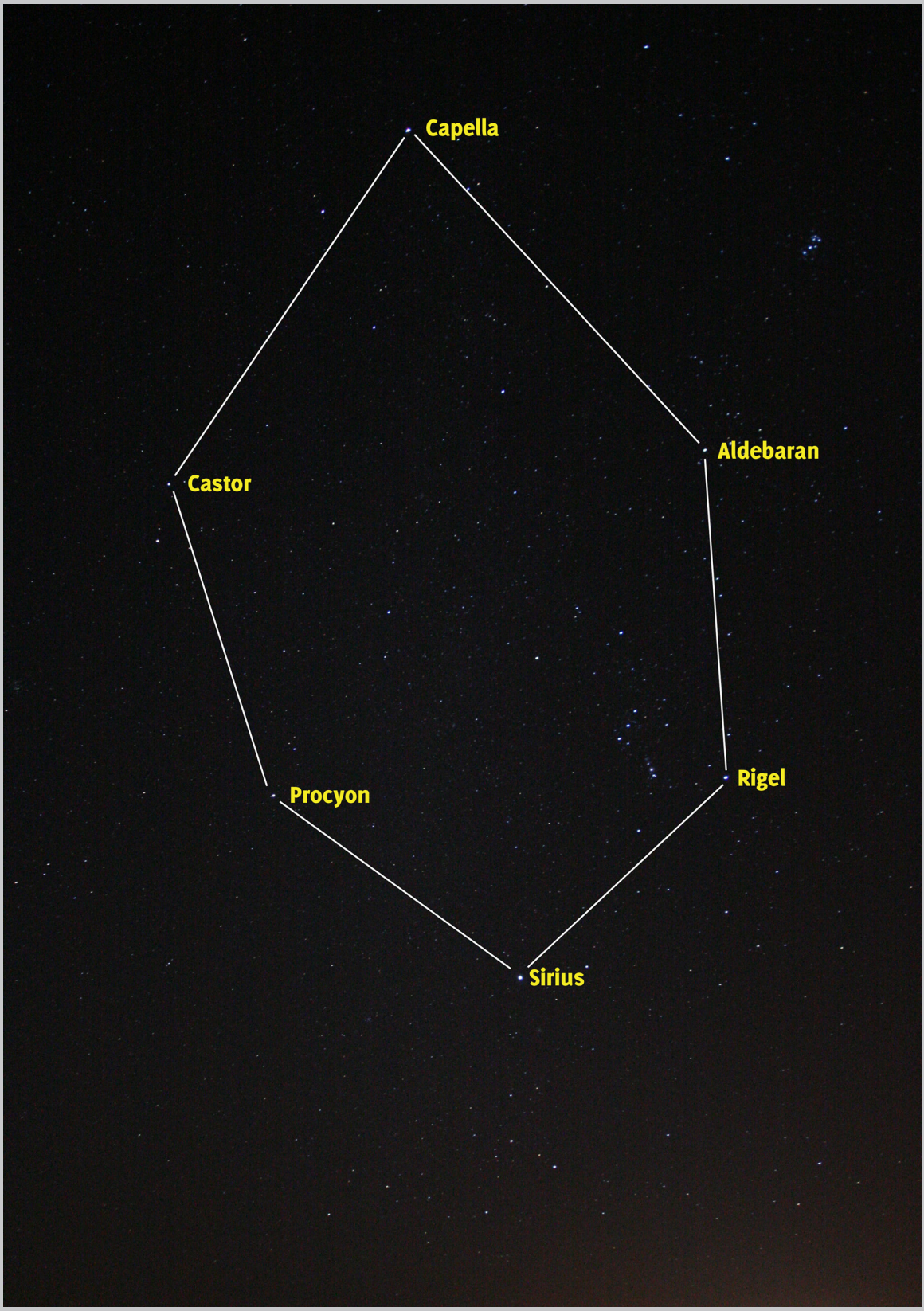
The team used the Sloan Digital Sky Survey (SDSS) to study a total of 21,347 galactic pairs in addition to an even larger group of galaxies in a control group. Overall, spiral galactic pairs in close proximity tended to be even bluer due to increased star formation taking place. The ratio was about two times for close pairs compared to 1.5 times for the wider-spaced pairs in the control group. One of the primary problems in doing such a survey is determining which galactic pairs are close and which are optically paired, but actually one of the two is a distant background galaxy.

As galaxy pairs separate over millions of years, star formation decreases and normally active spiral galaxies gradually redden due to the fact that their stars are aging.

Dr. Patton will present a version of this talk to members of the Peterborough Astronomical Association this year. It will be designed for a more general audience and there will be plenty of time for questions.

Dr. Patton's presentation was part of an on-going lecture series throughout the year. PAA members will be alerted in plenty of time to make plans to attend the next talk. Non-members can receive notices by contacting me at johnstargazer@xplornet.com . Just let me know you want to be on the list.

PHOTO GALLERY



A Winter Hexagon?

You learn something new every day. I had never heard of the Winter Hexagon until recently. The Summer Triangle, yes, but not a Winter Hexagon! That is what I like about "asterisms", they help you learn about the night sky and even better, it helps you teach others about it too. What a great way to help someone learn the brighter stars and the constellations that house them. What is an asterism? These are recognizably shaped "objects" that make up part of a constellation, like the seven brighter stars that form the Big Dipper (the asterism) within the larger and harder to see constellation of Ursa Major, or Big Bear.

If you can find Orion (The Hunter), with his three "belt stars", you should be able to find the Winter Hexagon. The Winter Hexagon involves some of the brightest stars (Alpha or main sequence stars) visible in the northern hemispheres winter southern sky in the late evening (before midnight). These stars together form a large and easily found pattern in the sky. The stars involved can usually be identified even in the bright night skies of a big city, although they appear here in the image as they do south of Peterborough, away from the glare of the city's light pollution. The six stars that compose the Winter Hexagon are, starting at the bottom (then counterclockwise), Sirius (in Canis Major, the brightest star in the night sky), Rigel (in Orion), Aldebaran (in Taurus), Capella (in Auriga), Castor (and Pollux if you wish, in Gemini), Procyon (in Canis Minor) and back to Sirius. The band of our Milky Way Galaxy runs through the center of the hexagon, while the open star cluster of the Pleiades is visible just above to the right and outside this asterism. The Winter Hexagon asterism engulfs several constellations including much of the iconic steppingstone Orion.

This slightly cropped image was taken with a tripod mounted Canon 400D and Sigma 10-20mm lens @ 10mm; ISO 800; f/4; 25 seconds, from my backyard on January 8th, at 10:12 p.m.

See this huge winter hexagon before it is gone! It is big and it is easy to see throughout the winter months in the southern sky. Look and learn for yourself, it is worth investing the time to learn some constellations and major stars. Let me know when you have seen it for yourself. Once you have found it, you will never forget it!

Photo by Rick Stankiewicz

Misadventures of an Aspiring Imager

Adventure #12—Getting Stacked.

JOHN GALLE

If you recall, I have now got to the point where I feel reasonably competent taking clear, crisp, reasonably high quality astro images, and I am fully computerized with all the required hardware and software. Next step is to capture a series of images of an appropriate target and combine them into a raw image ready for processing.

I won't get into the subject of target selection except to mention that I am only talking about deep sky objects; other targets would be handled somewhat differently.

After selecting and focusing in on the target and calibrating the autoguider, etc the next step is to determine the exposure time. There are all sorts of guidelines for doing this, but I make it easy on myself by using the exposure calculation routines in SkyTools, a charting and logging package from Skyhound ($100). A free source on the Web is Starizon.com, which has an easy to use calculator (plus all sorts of other great stuff).

Next step is actually taking the images. If all the preparatory work has been done properly this is about the easiest step in the entire process. In fact, if you set it up right you can set your alarm and go to bed!

Initially I didn't pay much attention to flats, darks and biases, but I've now come to realize that they can make a tremendous difference to the quality of your images. Taking these images is fairly straightforward. To make the flat images I made up a simple device using a luminescent panel and a scrap of white PVC—far easier than trying to get dawn or dusk sky shots.

One piece of advice that is given by virtually all the experts, and is probably initially ignored by all aspiring imagers, is to carefully document and file all images in an organized fashion. It is amazing how many images, in various stages of processing, that are rapidly accumulated. It will also pay big dividends to learn how to do sophisticated wild card searches of your image files.

So, at the end of a successful night you should land up with several raw images, along with a bunch of flats, darks and biases—all nicely documented and filed. Most, but not all, stacking software comes with the ability to load up the nights images in an orderly manner. Typically the next step is to visually inspect all the raw images using the software's image blinking capabilities. Often it will be discovered that some images have been ruined by satellite trails or the like—this is probably of little consequence if you've taken 100 one minute exposures, but if it's only 5 twenty minute exposures it's another matter. Many defects can be removed by paying a quick visit to PhotoShop prior to stacking.

I use ImagesPlus for the preliminary processing of my images. This program is designed specifically for one shot color and DSLR cameras; for monochrome processing there are many other better packages available. ImagesPlus does the processing in a relatively fixed sequence: filtering, normalizing, grading, aligning, and combining. It's easy to set up and seems to work very well—I certainly haven't had any complaints. The screen shot below illustrates the types of vari-

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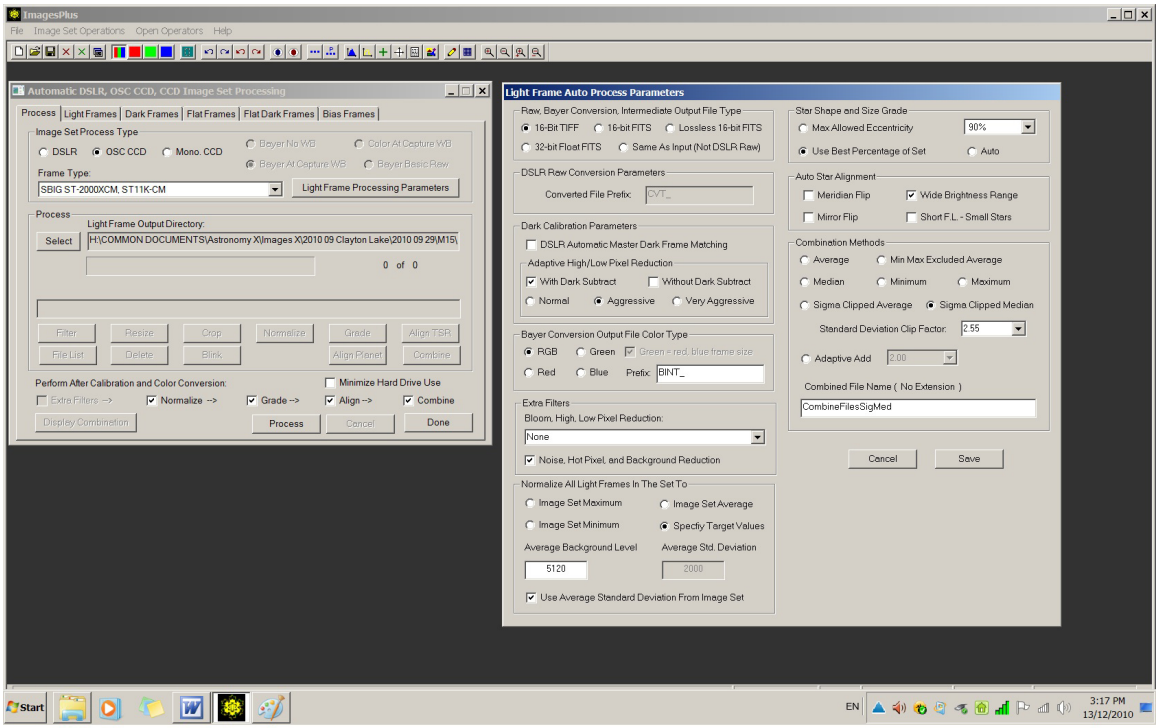
ables you will need to manipulate - fairly straightforward once you've mastered the terminology.



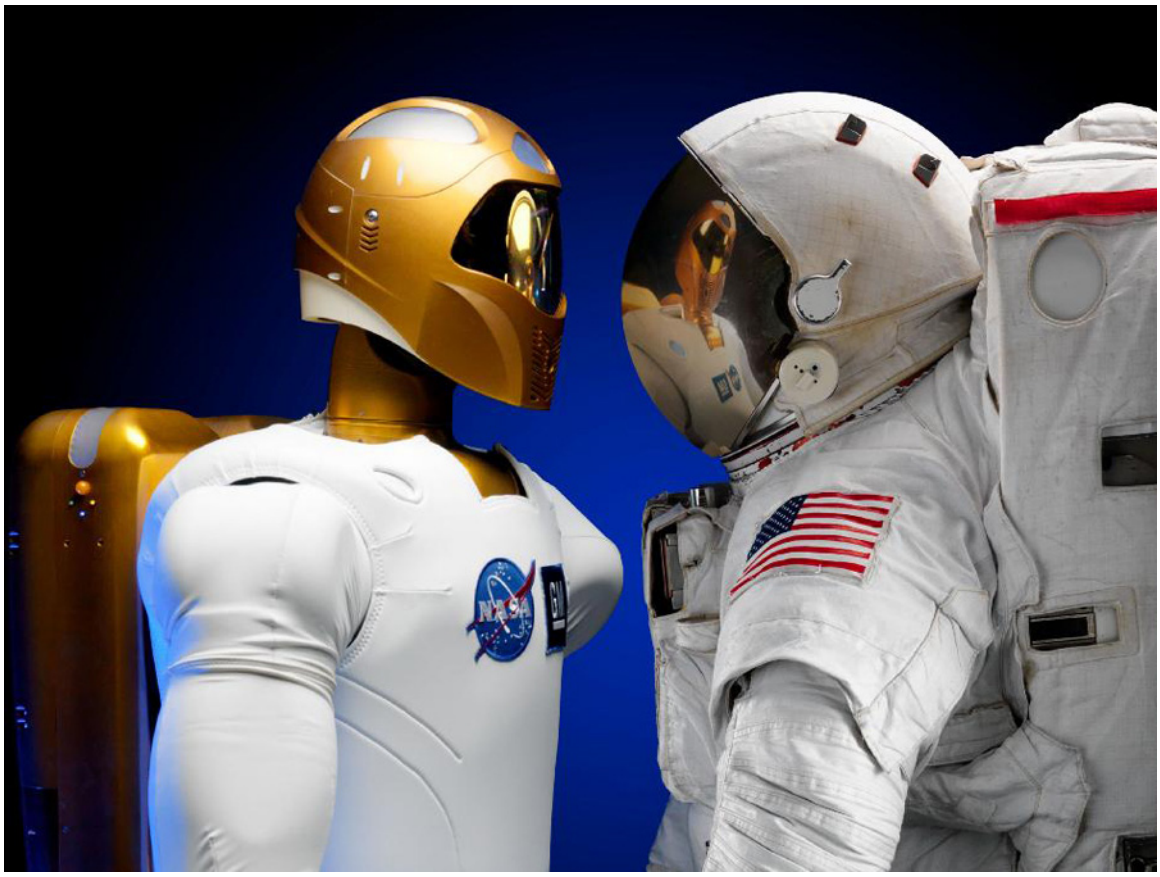
ImagesPlus batch processing

Be prepared for the actual processing to take quite a long time. Stacking 20-30 frames will take at least 5 minutes on my computer. You may be surprised to find that the resulting image looks something like the image below:

Stacked Image

see "Stacked" on page 14

When Astronauts Meet Robonauts



ROBONAUT AND ASTRONAUT. Who could best survive the tedium of a one year trip to Mars? My money is on the robonaut. How close are we to robonauts? Google "robonaut" and see for yourself. We're already testing the second generation of robonauts. Cylons beware. Photo courtesy of NASA.

JOHN CROSSEN

THE FIRST RUSIANS TO land on the Moon were rovers. The first Martian landers were also of the mechanical ilk. Since the astronauts walked on the Moon 40 years ago, all the recent exploratory work done in our solar system has been courtesy of robots, landers and orbiting satellites. And they're very sophisticated.

Both the Mars Rovers were outfitted with onboard laboratories, energy recharging solar panels, stereoscopic cameras that simulated the view humans would experience and a nifty little device called the RAT which is short for Rock Abrasion Tool. The RAT ground down rock samples for visual inspection as well as analysis. Rather than travelling on feet, the rovers had wheels. But that's just for now. In the not-so-distant future our cosmic explorers may also have hands and feet. They're called "robonauts" and they are the next step up in robotic refinement.

I first read about robonauts in an article on the International Space Station (ISS). There are a lot of general maintenance tasks that are currently done by the astronauts. But wouldn't it be great to have a helping hand on those space walks, even if it was a mechanical hand? Or simply sit inside while the robonaut does all the dirty work—without complaining.

That's the direction things are heading. It makes sense to me. After all, outer space is a very hostile environment. One little slip up or a micro meteor hit could put a hole in an astronaut's space suit. An unexpected solar burst could subject the astronaut to lethal radiation. A robonaut would be impervious to this. An astronaut on the other hand...not so.

see "Robonaut" on page 13

MOVIE REVIEW

Agora (2009)

Rick Stankiewicz

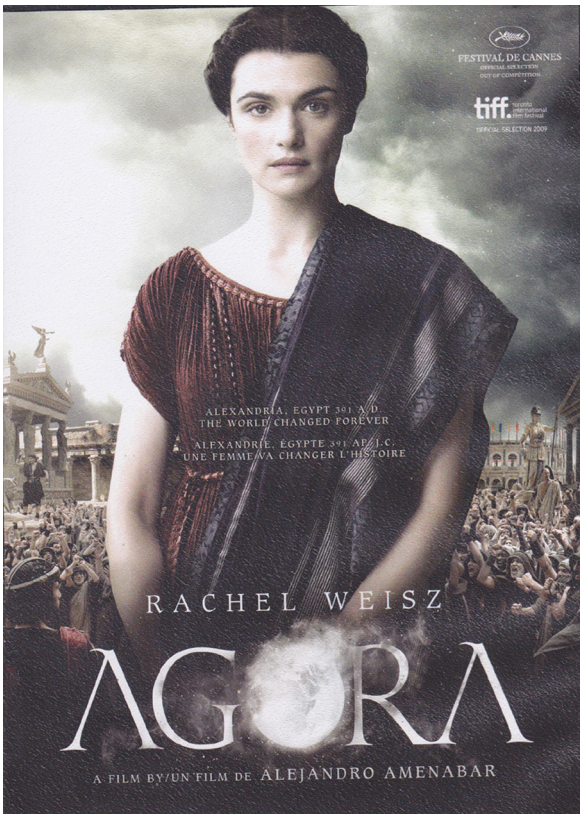
According to the the director, Alejandro Amenabar, he wanted to do a movie about astronomy and ended up doing a movie about a civilization (Alexandria). He wanted to concentrate on a character (Hypatia) and ended up covering the cultures and period in time when they collided and changed the world. You will be transported back to Egypt in 391 A.D. and introduced to some real historical figures of the time. The main character is Hypatia, a Greek scholar, who was a philosopher, mathematician and astronomer. Possibly ahead of her time (nothing concrete to prove all that is shown in the movie), but interesting to think of people over history that have challenged the status quo and this is just one of those stories.

It was my son (a history major) who insisted I rent this movie and was I ever glad I did. You will be introduced to the thinking of Hipparchus, and Ptolemy and the challenges that faced astronomers from their time until the 17th century. It took Johannes Kepler to nail the true solution to the order of our solar system. I will not go any further down that path and let you figure out what the challenges were.

This "period piece" is very well done, with some excellent acting by Rachel Weisz (Hypatia) and the supporting cast (no other big names in this line-up though).

I especially enjoyed the "special feature" on "Alexandria The Greatest City", as it was as informative as the movie, maybe even more so? You might even learn how to use an astrolabe (Greek for "star-taker"). In more recent times there have been both an asteroid (238 Hypatia—discovered in the "main asteroid belt" in 1884) and lunar crater named after Hypatia. The crater is rather small (41 x 28 km in diameter) compared to the much larger Theophilus (100 km), which lies to the southwest of her. These are all near *Mare Nectaris* (Sea of Nectar).

And why the title *Agora* you ask, well this is the Greek name for the "place of assembly" and you will have to see the movie for yourself to see the significance of this reference. This film may not be for everyone, but if you like to mix some astronomy with history and religion, you have a movie that is worth watching and very intense at times.



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Robonaut

If you think this is all blue-sky dreaming, Google "robonaut" and see what NASA has been up to lately. I guarantee you will be stunned. The robonaut can lift, write, turn, flex its fingers, everything a human can do. In fact, they are already referring to the robonaut as the 7th crew member onboard the space station. The science fiction of my youth has become science fact.

Will we eventually have robonaut/astronaut exploration teams on the Moon and Mars? I think so and it wouldn't surprise me if the first footprints left in the Martian soil would be those of a robonaut—one small step for mankind, a giant step for robotics!

We've come a long way since the original Canada Arm was installed on the ISS. The robonaut is the next step.

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Starburst Galaxy

to van Dokkum, "We're seeing 10 or 20 times more stars than we expected." By his calculations, that triples the estimated star count from 100 sextillion to 300 sextillion stars. Just to keep things in perspective, on a clear summer night from a dark rural site you can see between 1,500 and 2,000 stars with the naked eye. For a city dweller, the sight can be overwhelming the first time they see it. And it's just the tiniest tip of the iceberg as far as the actual number of stars go.

Until we meet again by the backyard telescope, keep your yard lights aimed down and the stars up big and bright—all 300 sextillion of them.

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Stacked

The reason for this is that the image, typically, is mostly registering the dark background with the dim details not enhanced. The next stage will be to extract the best possible image from these faint details. So, in the next instalment (which won't be for a few months as I'm getting ahead of myself) I'll get into some of my (anticipated!) misadventures with image processing, including:

- being color 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

The Sky this Month

Mercury disappears into the morning twilight. Superior conjunction on the 25th.

Venus is very bright in the eastern morning sky.

Mars is not visible. In conjunction with the sun on February 4th.

Jupiter in early evening western sky and sets mid-evening. Crosses north of the celestial equator on the 5th and will remain there until September 16, 2016.

Saturn is in the morning sky in Virgo in retrograde motion. Rises in the mid-evening.

Moon 1.4° south of the Pleiades on the 22nd.

Zodiacal Light visible in the northern latitude in the west after evening twilight for the next two weeks from the 20th.

Moon Phases

New Moon	9:31 PM	February 2
First Quarter	2:18 AM	February 11
Full Moon	3:36 AM	February 18
Last Quarter	5:26 PM	February 24

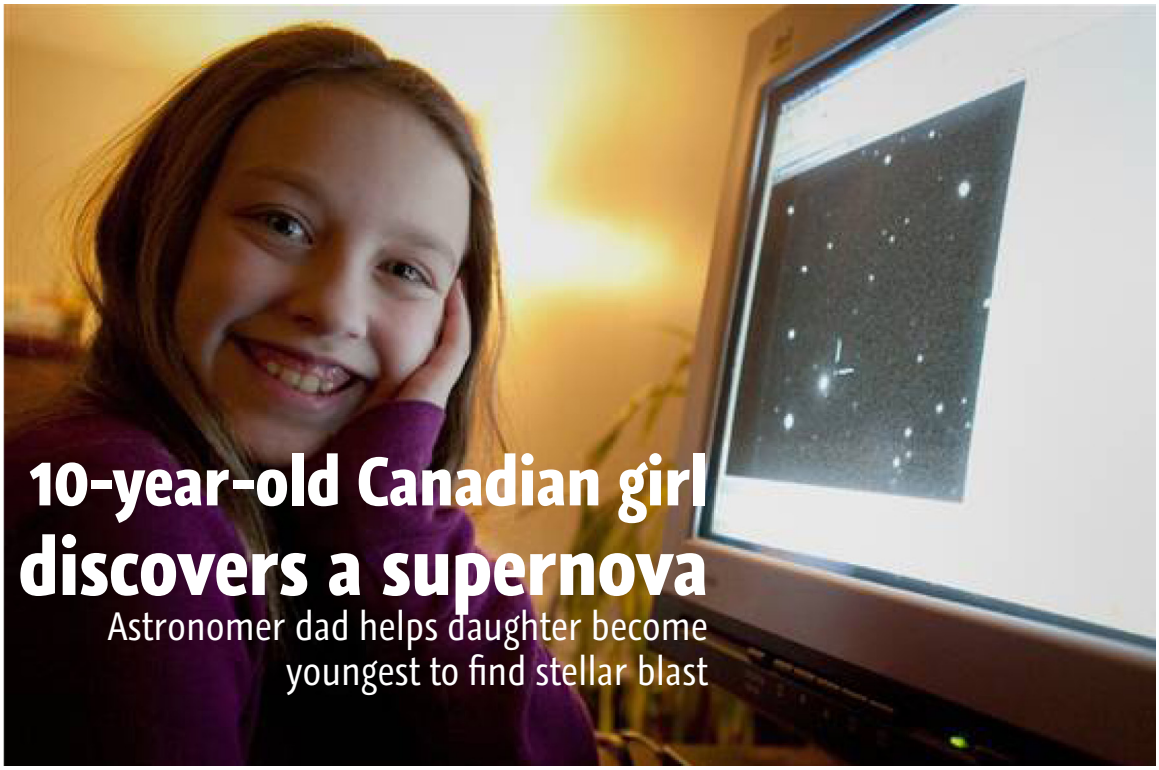

Photo by Rick Stankiev

RICK STANKIEW

10-year-old Canadian girl discovers a supernova

Astronomer dad helps daughter become youngest to find stellar blast

David Smith / AP
Ten-year-old Kathryn Gray sits next to a computer at the family's home in Birdton, New Brunswick, Canada, a suburb of Fredericton, on Monday. On the computer monitor is an image in which she discovered a supernova. The Royal Astronomical Society of Canada says she made the discovery on the weekend under the watch of two other astronomers.

A 10-year-old girl from Canada has discovered a supernova, making her the youngest person ever to find a stellar explosion.

The Royal Astronomical Society of Canada announced the discovery by Kathryn Aurora Gray of Fredericton, New Brunswick, (wonderful middle name!) who was assisted by astronomers Paul Gray and David Lane.

Supernova 2010lt is a magnitude-17 supernova in galaxy UGC 3378, in the constellation of Camelopardalis, as reported on IAU Electronic Telegram 2618. The galaxy was imaged on New Year's Eve 2010, and the supernova was discovered on Jan. 2, 2011, by Kathryn and her father Paul.

The observations were made from Abbey Ridge Observatory, and this is the third supernova seen from this observatory. It was Lane's fourth supernova discovery, Paul Gray's seventh, and Kathryn Gray's first.

The discovery was soon verified by Illinois-based amateur astronomer Brian Tieman and Arizona-based Canadian amateur astronomer Jack Newton.

Since a supernova can outshine millions of ordinary stars, it can be easy to spot with a modest telescope — even in a distant galaxy such as UGC 3378, which is about 240 million light-years away. The trick is to check previous images of the same location to see if there are any changes. That's what Kathryn was doing for the images of the galaxy taken by her father.

Supernovas are stellar explosions that signal the violent deaths of stars several times more massive than our sun, and can be used to estimate the size and age of our universe.

Supernovas are rare events. The Chandra X-Ray Observatory found evidence of a supernova explosion that occurred about 140 years ago in our galaxy (although no one saw the explosion take place), making it the most recent in the Milky Way. Previously, the last known supernova in our galaxy occurred around 1680, an estimate based on the expansion of its remnant, Cassiopeia A.

Source: Royal Astronomical Society of Canada. Universe Today report: "10-year-old girl discovers a supernova."

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parsecs (32.6 light-years) away—a distance at which the Sun would be one of the dimmest stars visible in the sky—the hypergiant would be as bright as the full moon, "definitely a daytime object," Kastner remarked.

Such hot stars have fierce solar winds, so Kastner and his team are mystified why any dust in the neighborhood hasn't long since been blown away. But there it is: an unmistakable spectral signature that both hypergiants are surrounded by mammoth disks of what might be planet-forming dust and even sand.

At the other extreme is a tiny brown dwarf star called Cha 110913-773444, relatively nearby (500 light-years) in the Milky Way. One of the smallest brown dwarfs known, it has less than 1 percent the mass of the Sun. It's not even massive enough to kindle thermonuclear reactions for fusing hydrogen into helium. Yet this miniature "failed star," as brown dwarfs are often called, is also surrounded by a flat disk of dust that may eventually clump into planets. (This brown dwarf discovery was made by a group led by Kevin Luhman of Pennsylvania State University.)

Although actual planets have not been detected (in part because of the stars' great distances), the spectra of the hypergiants show that their dust is composed of forsterite, olivine, aromatic hydrocarbons, and other geological substances found on Earth.

These newfound disks represent "extremes of the environments in which planets might form," Kastner said. "Not what you'd expect if you think our solar system is the rule."

Hypergiants and dwarfs? The Milky Way could be crowded with worlds circling every kind of star imaginable—very strange, indeed.

Keep up with the latest findings from the Spitzer at www.spitzer.caltech.edu. Kids and their grownup friends can enjoy beautiful images from Spitzer while playing Spitzer Concentration at The Space Place (spaceplace.nasa.gov/en/kids/spitzer/concentration).

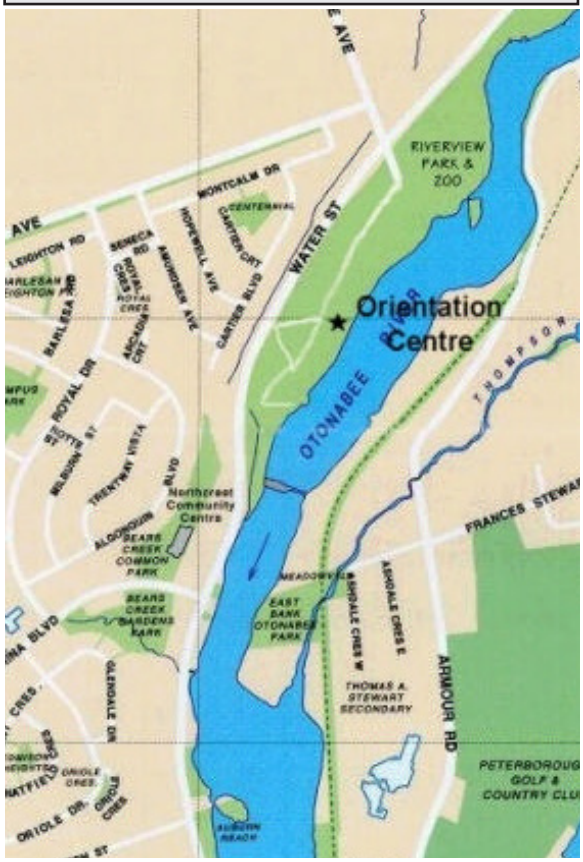
This article was provided courtesy of the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

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). If your article contains photso or graphics, please provide a separate file for each. 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@gmail.com

NEXT SUBMISSION DEADLINE:
JANUARY 25, 2011



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.