# Orbit

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# Issue Number 5, March, 2011
## Roger Hill, Editor

Santa didn't come through, but a friend did. He had an LX200 wireless hand controller, but the battery cover was missing. So I made one up from thin plastic, slapped in some batteries and took it outside to my 'scope to give it a try. I couldn't get it to work. Out came the multi-meter...no problem there...the batteries are good (my kids have a bad habit of not putting the old batteries in a separate place from the new ones). There's a little switch on the bottom that didn't seem to do anything, but no matter what I did, I couldn't get it to work. It took a fair bit of digging, but it seems like there is the occasional problem with Meades quality control (now there's a surprise!) and one of the battery contacts onto the circuit board occasionally suffers from a cold solder joint. Actually, it was more than that for this one...the positive end was broken off. Anyway, a quick bit of work with the soldering iron and the little switch at the bottom caused the hand controller to light up for about half a second and emit a quiet beep. I hooked it up to the scope and Voila! A working hand box. It was clear that night, and the controller was a joy to use...no more trying to push my thumb through controller to get it to work. The wireless is really nice to have, too, particularly in the cold. I gather that there is enough range on the thing that I'll be able to control the 'scope from inside the house. Sounds good to me! It will also mean that when I'm off in dark skies camping, that I'll be able to control it from the "bedroom" of my Kendrick tent...away from mosquitoes!

I also modified the tripod adapter that my 300mm SMC Takumar lens uses and it's now easier to focus. I'm going to make a Bahtinov mask for it to ensure critical focus, but if I use a bright enough red star like Betelgeuse, it's easy to see the red halo. Using live view on the Canon, I can then focus to minimize the halo and I'm good to go.

There's also something screwy with my autoguider at the moment, though. I have a QHY5, which has a built-in autoguider. You're supposed to be able to connect that port with the ST-4 compatible one on my LX200GPS, and the camera will push the scope the requisite tiny amounts...no need to use up a COM port for guiding...you can use that for controlling your telescope. Anyway, although everything seems fine when starting up the guiding software (PHD—Push Here Dummy...it's free...you expected me to use something else?), but when it tries to calibrate the mount, it will not push the scope east or west.

Astrophotography...there's always something going wrong!

Which brings me to the next topic. The astrophotography special interest group. The first meeting will be on Thursday, March 24th. They'll typically be around last quarter Moon so the skies will be relatively dark. There are other reasons, too. Like people not having everything packed away for weekends under New Moon skies. We had thought that perhaps we should meet on a Friday evening, but as it was pointed out to me, people like to get away for weekends. So...Thursday night it is! I've heard that the new focuser for the 16" has been shipped, but not if it's been installed (or even if it has arrived!). It came in under budget, thanks, I suspect, to the Canadian dollar being at, or close to, par with the US currency. Then again, it could have been due to the negotiating skills of our VP. Andy can be quite persuasive, particularly when it comes to money issues!

We'll be looking at things like what you can do with just a tripod and an ordinary lens, piggy-back work, guiding, telephoto lenses, prime focus, processing, equipment, and all the other equipment, knowledge, and techniques that make this subset of amateur astronomy so frustrating and ultimately rewarding.

As you'll see later in Orbit (What you Missed Last Month), we had a very good time at the DDO in Toronto. Despite the horrendous weather, over 30 people showed up...some from as far away as Kitchener! There were a number of people who tried to make it from London, but turned back after an hour and barely 40 km. Paul gave a great talk on remote observing, but what made it special was a picture of him, and Gary Colwell from about 40 years ago. Also in the picture was a former member of the Hamilton Centre junior group, Rob Pike. Also in attendance was Bob Speck and his wife. I

I haven't had a chance to chat with Bob in quite some time, which is a shame, as I thoroughly enjoyed what little time we had this time. He also brought with him two reels of Sony videotape. They used to belong to Ken Chilton, and Bob got them from Kens widow, Bev, when she was clearing out some stuff some years ago. They were videotapes of a lunar eclipse from July, 1972 which I had made. Two weeks after coming back from (successfully) seeing the total solar eclipse in the Gaspe Peninsula (Thanks, Peter), there was a partial lunar eclipse. I was trying to emulate Ken at the time, and putting on a cable TV show in Burlington. I borrowed a TV camera, and a huge suitcase sized VTR, which I set up in my Burlington backyard. I managed to get a viewable image on the tiny monitor in the back of the camera by pointing the lens through the eyepiece of my 4" f/8 reflector. I later swapped the tapes for, if memory serves, a World War 2 vintage Union Jack flag. There was probably some history behind the flag, but I have no idea what it was.

I'm not sure what I can do with these tapes. I suspect that there's nothing around that can play them, even assuming that there's still some data on them after almost 40 years. Still...it was my first foray into video astronomy. It brought back some delightful memories of Ken Chilton. I also told Bob that I still had the front page of the Spectator that had his and Kens photograph on it a couple of days prior to the Apollo 11 moon landing. The angle was that Bob and Ken were looking for Transient Lunar Phenomena, possible bright events sometimes seen on the Moon, and they would alert NASA if they saw something, to alert Neil, Buzz and Mike. Anyway, Bob still has a framed copy of that front page.

Another Bob showed up that night that I also haven't seen for a while: Bob Botts. Bob showed up with some fairly serious looking camera equipment and seemed to be having a really nice time photographing the venerable old 74" scope. He's hoping to get some time with the scope when no-one else is around, so he can take some truly great pictures of it.

There was another fellow there with his father, both of whom had made the trek from Kitchener. Robert Lonsdale (another Bob...the place was crawling with them that night!) had brought his father (Robert E. Lonsdale) along because his dad had taken the iconic picture inside the dome back in September, 1969. The senior Lonsdale must have been quite proud of the picture he took because it was used on many postcards (and may still!). You can see a number of the pictures they took that night here: http://www.facebook.com/album.php?aid=49641&id=1814022886&l=53521e2806 . Another record of a very pleasant evening!

If it wasn't for the snow, it would have been even better, but they couldn't even open up the dome for us. The unheated (naturally) building made walking quite treacherous as the snow on the bottom of our boots turned the very smooth floor into a skating rink. What I hadn't realized was that the DDO was the second largest telescope in existence at the time, only the 100" Hooker in California was larger. The third largest was at the DAO in Victoria. So, from the mid 30's to when the 200" Palomar came online in January, 1949, Canada had two of the three largest telescopes in the world. The DDO isn't even the largest telescope in Canada, anymore. That honour goes to the Large Zenithal Telescope, a 6 metre, liquid mercury telescope in BC. There's a 3 metre version at the University of Western Ontario, so the Dunlap scope isn't even the largest in Ontario anymore.

It's still an impressive sight, though. So much so, that we're going to book it again for our October meeting, to be held on Saturday evening, October 1st. It's highly unlikely we'll be snowed out that night! The cost will be the same—$10.

So...that's all for this month,

Clear skies, one and all,

Roger Hill
Orbit editor and President.

# Thank Goodness the Sun is Single

By Trudy E. Bell

It's a good thing the Sun is single. According to new research, Sun-like stars in close double-star systems "can be okay for a few billion years—but then they go bad," says Jeremy Drake of the Harvard-Smithsonian Astrophysical Observatory in Cambridge, Mass.

How bad? According to data from NASA's Spitzer Space Telescope, close binary stars can destroy their planets along with any life. Drake and four colleagues reported the results in the September 10, 2010, issue of *The Astrophysical Journal Letters*.

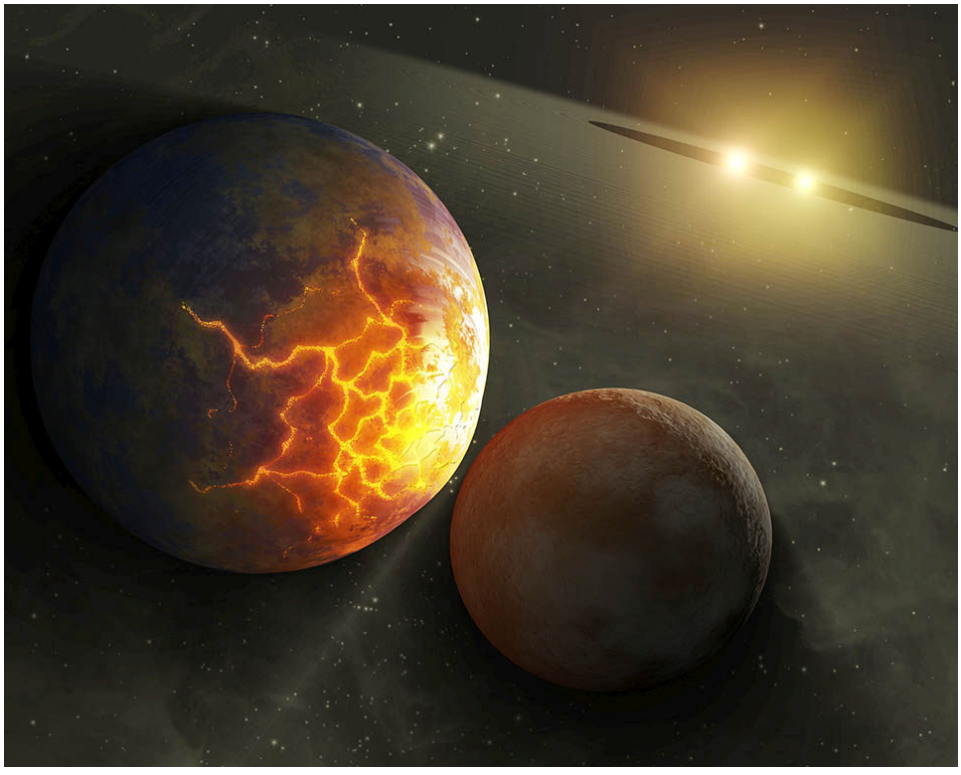
Our Sun, about 864,000 miles across, rotates on its axis once in 24.5 days. "Three billion years ago, roughly when bacteria evolved on Earth, the Sun rotated in only 5 days," explains Drake. Its rotation rate has been gradually slowing because the solar wind gets tangled up in the solar magnetic field, and acts as a brake.

But some sun-like stars occur in close pairs only a few million miles apart. That's only about five times the diameter of each star—so close the stars are gravitationally distorted. They are actually elongated toward each other. They also interact tidally, keeping just one face toward the other, as the Moon does toward Earth.

Such a close binary is "a built-in time bomb," Drake declares. The continuous loss of mass from the two stars via solar wind carries away some of the double-star system's angular momentum, causing the two stars to spiral inward toward each other, orbiting faster and faster as the distance shrinks. When each star's rotation period on its axis is the same as its orbital period around the other, the pair effectively rotates as a single body in just 3 or 4 days.

Then, watch out! Such fast spinning intensifies the magnetic dynamo inside each star. The stars "generate bigger, stronger 'star spots' 5 to 10 percent the size of the star—so big they can be detected from Earth," Drake says. "The stars also interact magnetically very violently, shooting out monster flares."

Worst of all, the decreasing distance between the two stars "changes the gravitational resonances of the planetary system," Drake continued, destabilizing the orbits of any planets circling the pair. Planets may so strongly perturbed they are sent into collision paths. As they repeatedly slam into each other, they shatter into red-hot asteroid-sized bodies, killing any life. In as short as a century, the repeated collisions pulverize the planets into a ring of warm dust.



The infrared glow from this pulverized debris is what Spitzer has seen in some self-destructing star systems. Drake and his colleagues now want to examine a much bigger sample of binaries to see just how bad double star systems really are.

They're already sure of one thing: "We're glad the Sun is single!"

Read more about these findings at the NASA Spitzer site at www.spitzer.caltech.edu/news/1182-ssc2010-07-Pulverized-Planet-Dust-May-Lie-Around-Double-Stars . For kids, the Spitzer Concentration game shows a big collection of memorable (if you're good at the game) images from the Spitzer Space Telescope. Visit spaceplace.nasa.gov/en/kids/Spitzer/concentration/.

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

# Wide Field Fixed Tripod Astrophotography—Joe Roberts

Wide Field Fixed Tripod Astrophotography is the simplest form of astrophotography. It is the ideal starting point because it takes only basic equipment, and even "first timers" can get very nice results! To get started you'll need a Camera, Lens and a Tripod

**The Camera:** To do astrophotography, it should be obvious that you will need a camera. What is not necessarily so obvious is the type of camera that is best suited to astrophotography. In short, the more "idiot proof" a camera is, the more the likelihood that it is *not* well suited to astrophotography! "Point and Shoot automatic do everything" cameras are not suitable for astrophotography. The best camera to use is a Digital Single Lens Reflex (DSLR) camera. Most any DSLR will work for astrophotography, below is a listing of the important features required for astrophotos:

1. The camera should have removable/interchangeable lenses (most any DSLR will meet this requirement).
2. The camera must have the ability to do long time exposures (it should have a "B" setting in addition to pre-set exposure times such as 15, 20 and 30 seconds).
3. The camera should have the ability to accept a remote shutter release cable or have a remote control that allows the shutter to be released without actually touching the camera.
4. The camera must have a tripod mount threaded hole on the bottom.

There are many cameras available that meet the above criteria. Brand names that come to mind include Canon, Nikon, Pentax, Olympus, etc (there are many others too). The camera of choice recently has been the Canon XSi. It hits a nice sweet spot in regard to features, price, performance and with it being a Canon, it'll be much easier to use on our 16".

**The Lens:** For basic astrophotography, the basic lens that comes "standard" with most camera packages will work fine. Typically this lens will be something like a 18-55mm zoom lens. When it comes to astrophotos, having a fast lens is better (fast meaning smaller "F" number). For example, F8 is kind of slow, whereas F2 would be considered "fast". Most entry level DSLR zoom lenses (like the one I mention above) have an F-ratio of around F4, this is fine for starting out.

**The Tripod:** The tripod should be sturdy enough to hold the camera securely. Some DSLR cameras might be a bit heavy for very small tripods (the last thing you want is for the tripod to fall over). Most any medium duty (or better) tripod should work. The tripod ideally will allow several degrees of adjustment to allow you to easily aim the camera where you want. The photo below shows the basic setup you'll need to do your first astrophotos. The camera shown is a Pentax K-x Digital SLR with an 18-55mm f/3.5-5.6 AL Lens.


How do I set up the Camera?
The exact instructions will vary from camera to camera, but these are the basic high level steps:

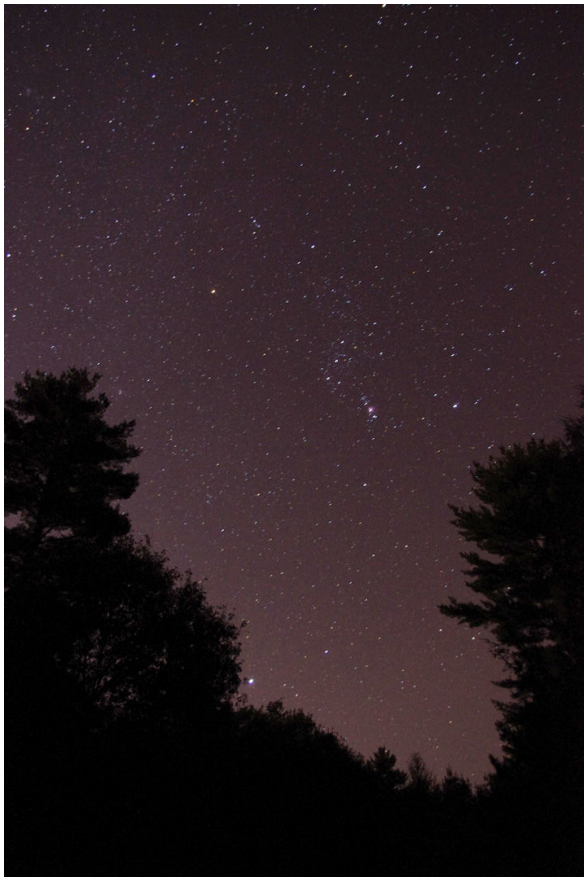
1. Set the camera up for manual mode.
2. Set the ISO to something like 800 or 1600 (don't go too high with it just yet as very high numbers like 6400 can cause a lot of "noise" in the image).
3. Set the camera to take a 15 or 30 second exposure to start (many cameras have a setting for this).
4. Set up the camera so that you can remotely activate the shutter. This might be a cable release or a remote control (depends on the camera brand).
5. F ratio: if your lens allows it, set it to the fastest F-ratio setting (smaller numbers are faster).
6. Lens Zoom: for starting out, keep the zoom fairly wide. Mount your camera on a tripod and aim it at an area where there are some bright stars.
7. Focus. Most likely you will need to set the camera to manual focus mode. Stars are not bright enough for most DSLRs to focus on. Further, stars don't look very bright in camera viewfinders (or on the LCD screen) so focusing can be tricky at first. You may have to do some trial and error to get it right. The good news is that if a shot is no good you simply delete it and try again (no wasted film like the old days).

Once all of the above items are set, try taking several exposures. Do experiment! This is how you will learn what works best for your camera. Try changing the ISO speed (400 is probably the lowest value you'll want to try on stars), try shorter and longer exposures, etc. Try some shots with trees in the background, this can add a nice effect. Once you have a few shots, bring the camera in and download them to your computer (the camera's LCD screen will only give a rough idea of what your true results are). Keep notes as to what worked and what didn't. Chances are you'll have at least a couple of decent shots for your efforts! The photo below is a shot of the north star region from my backyard taken with a Pentax K-x camera. This is a 20 second exposure with the ISO set to 1600. A very bright Moon was in the sky (the reason the sky is blue and also why the trees are lit up fairly well.

**Assessing the results...** Your first shots may not be perfect, but chances are you will have at least several good shots! Do you notice that the stars appear as tiny streaks even on the short exposures? Although it does not seem to, the Earth really does rotate enough to leave a short star trail even on a 30 second exposure! Notice also that the longer exposures may have recorded more stars (especially if the camera was aimed at the polar region and/or your sky is very dark). Do you see unexplained "ghosts" in your images? If so, this can be caused by stray light (from nearby streetlights or floodlights) that is scattered by the camera lens. The remedy for this? Be sure that your camera is completely shielded from stray light sources. Are your photos washed out to the point where it looks like they were taken in twilight? If so, the light pollution in your area may be the problem (you'll have to get to a dark sky area to eliminate this problem). Do you see the various colors of the stars? If you took a photo of the constellation Orion you should see both red and blue stars (cameras are great for capturing star colors as compared with the human eye).

**Experiment!** As mentioned, cameras are great for picking up colors that the human eye cannot see well. The photo (left) is of Orion, but the lens was intentionally defocused. This will enlarge the stars considerably and allow them to really show their colors (the downside is that you will record less stars the more the image is defocused).

Notice how well the colors stand out in the above photo! Finally, at right is a shot of the Orion area with stars focused normally. Results like this are easily within the reach of just about anyone. with a DSLR camera!



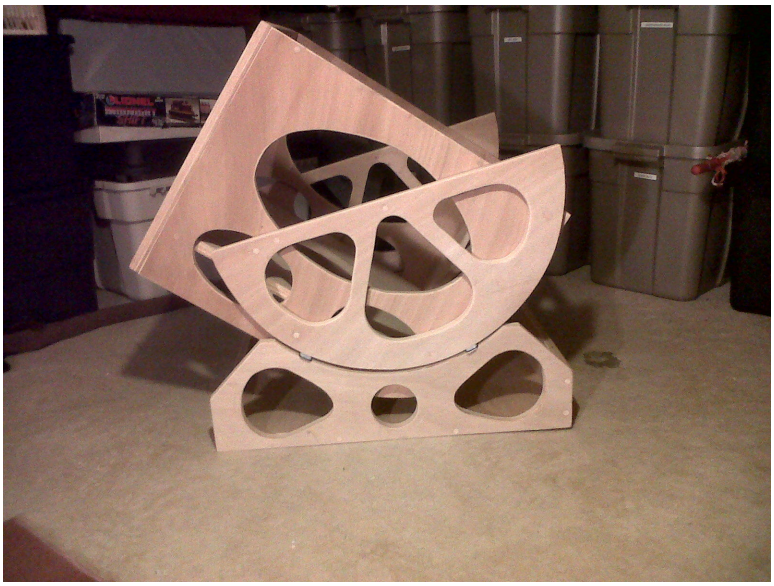
# The new version of the 17.5” is taking shape…

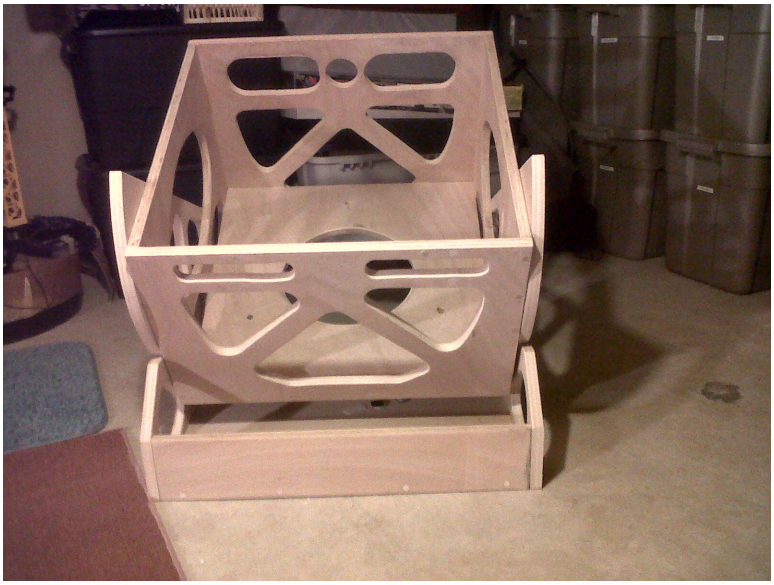
Last year, the decision was made to convert the venerable 17.5” telescope to a Dobsonian. The scope had done yeoman's work over two decades, and while it had shown many Hamilton Centre members, and visitors, some amazing sights over the years, the arrival of the 16” Trillium scope meant that the big 17.5 was marginalized.

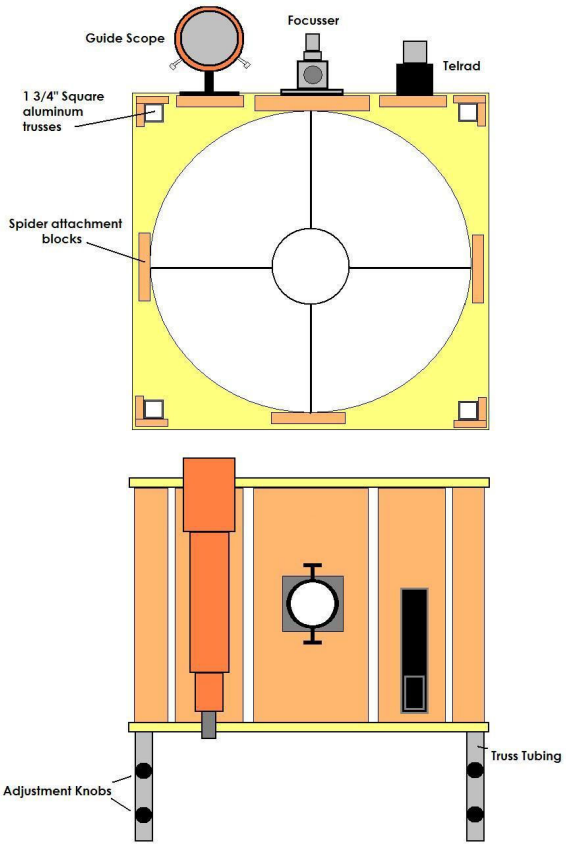
Loathe to just cast aside a large aperture instrument, it was decided that we should attempt to give it a new lease on life by making it portable. As a Dobsonian, the scope could be taken out into the parking lot, out to the road, or to sidewalk astronomy events.

Of course, what happens when you put two perfectionists in charge of such a project? Well, you get a project that takes far longer to do than any of us expected! After all, both Gary and Andy have lives outside of astronomy (although it may not seem that way at times!).

Anyway, I got some pictures of the rocker box assembly from Gary today, and an idea of the upper cage. So, here’s what we’ve got to look forward to:







Green light for giant telescope

The University of Hawaii has applied for and been granted a Conservation District Use Permit (CDUP) to build and operate the Thirty Meter Telescope (TMT) on Mauna Kea. The permit was granted by the Board of Land and Natural Resources (BLNR) of Hawaii's Department of Land and Natural Resources (DLNR).

The permitting process began on September 1, 2010, with the approval of a Draft Conservation District Use Application by the DLNR. This draft was open for public comment until November 23, 2011. The DLNR then held public hearings on December 2-3, 2010, to receive comments on the application. The application was approved at the BLNR's open meeting on February 25, 2011. Also at this meeting the BLNR granted a Contested Case at the request of petitioners, which will be addressed at a separate meeting.

The CDUP is the final step in what has been a multi-year process that began in July of 2009 when TMT's Board of Directors selected Mauna Kea as the preferred site for the telescope. This selection followed an unprecedented five-year global campaign to identify locations with the best atmospheric and environmental conditions for observing. The TMT then completed a rigorous Environmental Impact Statement, which began in 2008. The EIS was finalized and approved in 2010 by the then governor of Hawaii Linda Lingle.

The TMT now requires a sublease from the University of Hawaii, which leases the Astronomy Precinct lands from the DLNR. The sublease requires approval by the UH Board of Regents, the TMT Board, and the BLNR.

The TMT will be the world's most advanced and capable optical/infrared observatory. It will be sited on the northern plateau of Mauna Kea at a location known as 13N within Area E. The site is part of Mauna Kea's 525-acre Astronomy Precinct and was identified in the 2000 Mauna Kea Science Reserve Master Plan as the preferred location for the future development of a next generation large telescope. This location was singled out because of its outstanding observing conditions and its reduced impact on existing facilities, natural habitats, and archaeological and historical sites.

"The Thirty Meter Telescope has worked diligently during the past three years to design an observatory that would minimize its environmental and cultural impact," said Sandra Dawson, TMT's Manager of Hawaii Community Affairs. "The TMT project also fulfills the requirements outlined in the recently approved Comprehensive Management Plan for Mauna Kea. This plan provides the guiding principles for the use and stewardship of the mountain for all purposes, including astronomy."

In addition to the telescope, the TMT project will include an access roadway to the site, a support building, underground utilities, and a headquarters in Hilo.

The TMT project is an international partnership among the California Institute of Technology, the University of California, and the Association of Canadian Universities for Research in Astronomy, joined by the National Astronomical Observatory of Japan, the National Astronomical Observatories of the Chinese Academy of Sciences, and the Department of Science and Technology of India.

# ‘Weird science’ uncovered inside neutron star

(Edmonton) A University of Alberta astronomer has glimpsed the inner working of a neutron star and found a world where the physics can only be described as “weird.” Craig Heinke’s team found the neutron star’s core contained a superfluid, a frictionless liquid that could seemingly defy the laws of gravity.

“If you could put some of this superfluid in a jar it would flow up the walls of the container and over the edge,” said Heinke.

A neutron star is the extremely dense core left behind from an exploding star, or supernova.

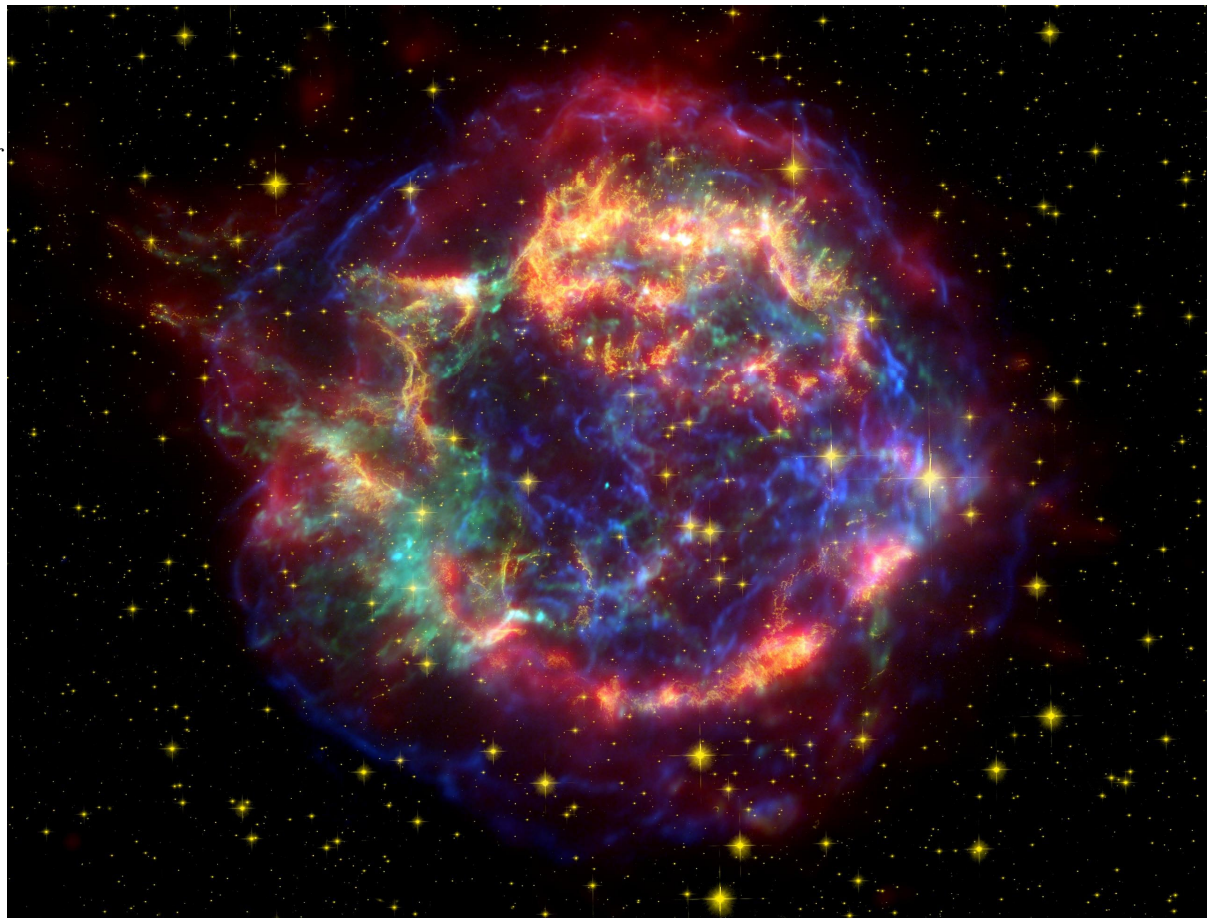
Heinke says the core of the neutron star also contains a superconductor, a perfect electrical conductor. “An electric current in a superconductor never loses energy—it could keep circulating forever.”

These discoveries came about when the researchers used NASA’s Chanda space satellite telescope to investigate a neutron star known as Cassiopeia A. The star is 11,000 light years from Earth and space observing equipment detected a sudden temperature change on its surface.

The researchers determined that the neutron star’s surface temperature is dropping because its core recently transformed into a superfluid state and is venting off heat in the form of neutrinos, sub-atomic particles that flood the universe. Here on Earth our bodies are constantly bombarded by neutrinos; for example, 100 billion neutrinos passing harmlessly though our eyes every second.

They also found that the neutron star's interior contains a superconductor, which affects how the neutron star cools. “This research helps us better understand stars, and the behaviour of matter at levels of density and heat that could never be duplicated and studied here on Earth,” said Heinke

Heinke is a co-author of the research published this month in the *Monthly Notices of the Royal Astronomical Society.* .Heinke says that, because this neutron star was formed just 330 years ago, it offers researchers a great opportunity.



“We’ve got ringside seats to studying the life cycle of a neutron star, from its collapse to its present cooling-off state.”

## The Star Splitter

`You know Orion always comes up sideways.
Throwing a leg up over our fence of mountains,
And rising on his hands, he looks in on me
Busy outdoors by lantern-light with something
I should have done by daylight, and indeed,
After the ground is frozen, I should have done
Before it froze, and a gust flings a handful
Of waste leaves at my smoky lantern chimney
To make fun of my way of doing things,
Or else fun of Orion's having caught me.
Has a man, I should like to ask, no rights
These forces are obliged to pay respect to ?
'So Brad McLaughlin mingled reckless talk
Of heavenly stars with hugger-mugger farming,
Till having failed at hugger-mugger farming
He burned his house down for the fire insurance
And spent the proceeds on a telescope
To satisfy a lifelong curiosity
About our place among the infinities.

`What do you want with one of those blame things ?'
I asked him well beforehand.
`Don't you get one !'
`Don't call it blamed; there isn't anything
More blameless in the sense of being less
A weapon in our human fight,' he said.`
I'll have one if I sell my farm to buy it.'
There where he moved the rocks to plow the ground
And plowed between the rocks he couldn't move,
Few farms changed hands; so rather than spend years
Trying to sell his farm and then not selling,
He burned his house down for the fire insurance
And bought the telescope with what it came to.
He had been heard to say by several :`
The best thing that we're put here for's to see ;
The strongest thing that's given us to see with's
A telescope. Someone in every town
Seems to me owes it to the town to keep one.
In Littleton it might as well be me.'
After such loose talk it was no surprise
When he did what he did and burned his house down.

Mean laughter went about the town that day
To let him know we weren't the least imposed on,
And he could wait -- we'd see to him tomorrow.
But the first thing next morning we reflected
If one by one we counted people out
For the least sin, it wouldn't take us long
To get so we had no one left to live with.
For to be social is to be forgiving.
Our thief, the one who does our stealing from us,
We don't cut off from coming to church suppers,
But what we miss we go to him and ask for.
He promptly gives it back, that is if still
Uneaten, unworn out, or undisposed of.
It wouldn't do to be too hard on Brad
About his telescope. Beyond the age
Of being given one for Christmas gift,
He had to take the best way he knew how
To find himself in one. Well, all we said was
He took a strange thing to be roguish over.
Some sympathy was wasted on the house,
A good old-timer dating back along ;
But a house isn't sentient; the house
Didn't feel anything. And if it did,
Why not regard it as a sacrifice,
And an old-fashioned sacrifice by fire,
Instead of a new-fashioned one at auction ?

Out of a house and so out of a farm
At one stroke (of a match), Brad had to turn
To earn a living on the Concord railroad,
As under-ticket-agent at a station
Where his job, when he wasn't selling tickets,
Was setting out, up track and down, not plants
As on a farm, but planets, evening stars
That varied in their hue from red to green.

He got a good glass for six hundred dollars.
His new job gave him leisure for stargazing.
Often he bid me come and have a look
Up the brass barrel, velvet black inside,
At a star quaking in the other end.
I recollect a night of broken clouds
And underfoot snow melted down to ice,
And melting further in the wind to mud.
Bradford and I had out the telescope.
We spread our two legs as we spread its three,
Pointed our thoughts the way we pointed it,
And standing at our leisure till the day broke,
Said some of the best things we ever said.
That telescope was christened the Star-Splitter,
Because it didn't do a thing but split
A star in two or three, the way you split
A globule of quicksilver in your hand
With one stroke of your finger in the middle.
It's a star-splitter if there ever was one,
And ought to do some good if splitting stars'
Sa thing to be compared with splitting wood.

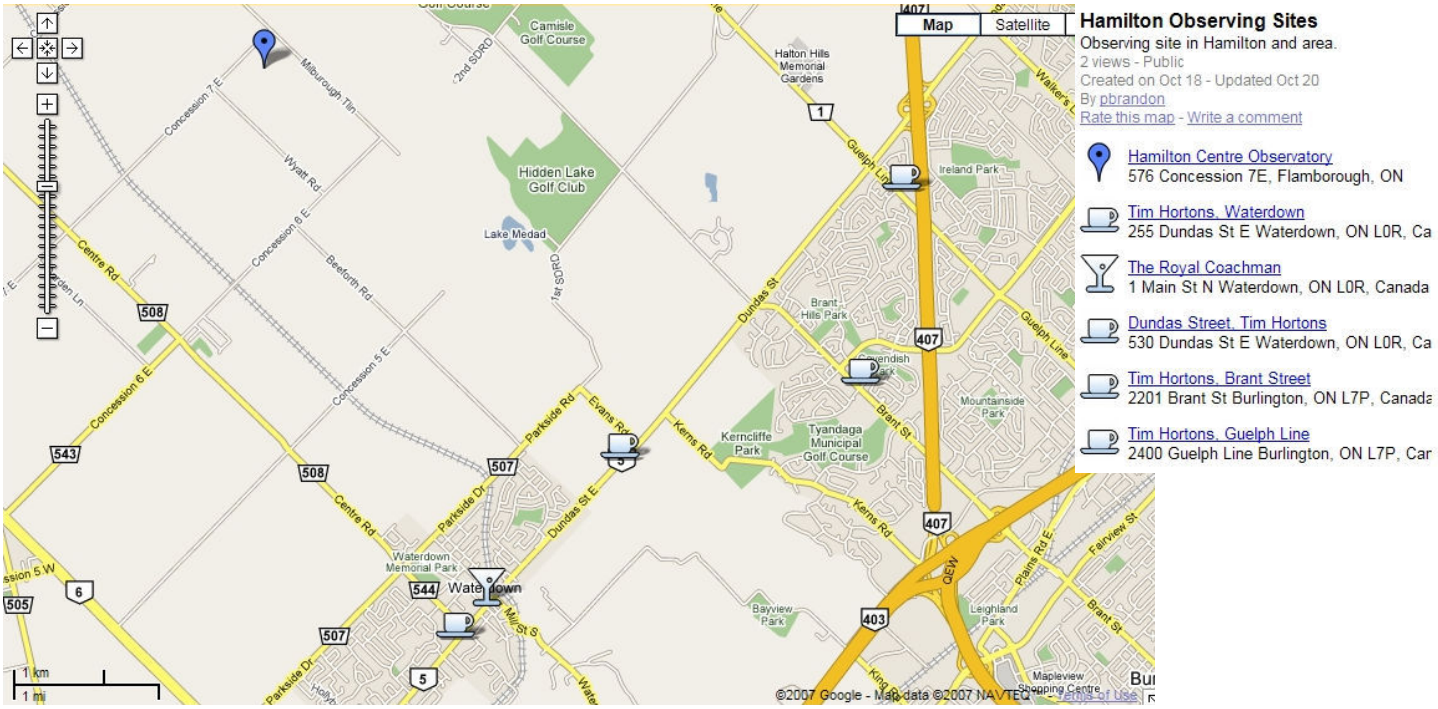
We've looked and looked, but after all where are we ?
Do we know any better where we are,
And how it stands between the night tonight
And a man with a smoky lantern chimney ?
How different from the way it ever stood ?

Robert Frost

# What you missed in February...!

A trip to the David Dunlap Observatory, in Richmond Hill, is what! Not only was there a great talk from Paul Mortfield, but we got a good tour of the telescope too, despite the treacherous footing.

It was so good, that we'll do it again on Saturday, October 1st! Mark your calendars.




**Website:** **http://www.hamiltonrasc.ca/**

576 Concession 7 East, Flamborough ON
N43° 23’ 27” W79° 55’ 20”

**E-Mails:**

| | |
|---|---|
| General Inquiries: | hamiltonrasc@hamiltonrasc.ca |
| President: | president@hamiltonrasc.ca |
| Secretary: | secretary@hamiltonrasc.ca |
| Treasurer: | treasurer@hamiltonrasc.ca |
| Orbit Editor: | orbit@hamiltonrasc.ca |
| Web master: | webmaster@hamiltonrasc.ca |

**Hamilton Centre, RASC**
**c/o Mr. A. Blanchard**
**2266 Lakeshore Rd. W.**
**Oakville, Ontario**
**L6L 1G8**

What you Missed pictures by Roger Hill. Front cover photograph by Roger Hill

**Don’t forget, our meetings from January to June (except February) will be held at the Royal Canadian Legion, 79 Hamilton Road in Waterdown.**