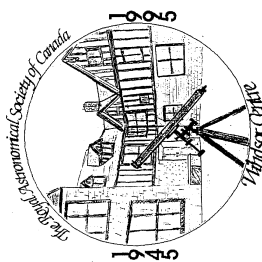




AURORA



June 2007

The Royal Astronomical Society of Canada - Windsor Centre

Volume 32, Number 11

The Windsor Centre at Earth Day (photos by Paul Pratt)



Rick Marion

Ken Roung



Sue S-B

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Calendar of Events

Our next meeting...

Tuesday, Sept 18th, 2007 7:30 p.m.
at
K of C Maidstone Recreation Centre
10720 County Road 34 (Old Hiway 3)

Main Speaker... (Tentative)

Steve Pellarin

Topic...

McNaught Comet

NOTE the NEW STARTING TIME

Coming Events

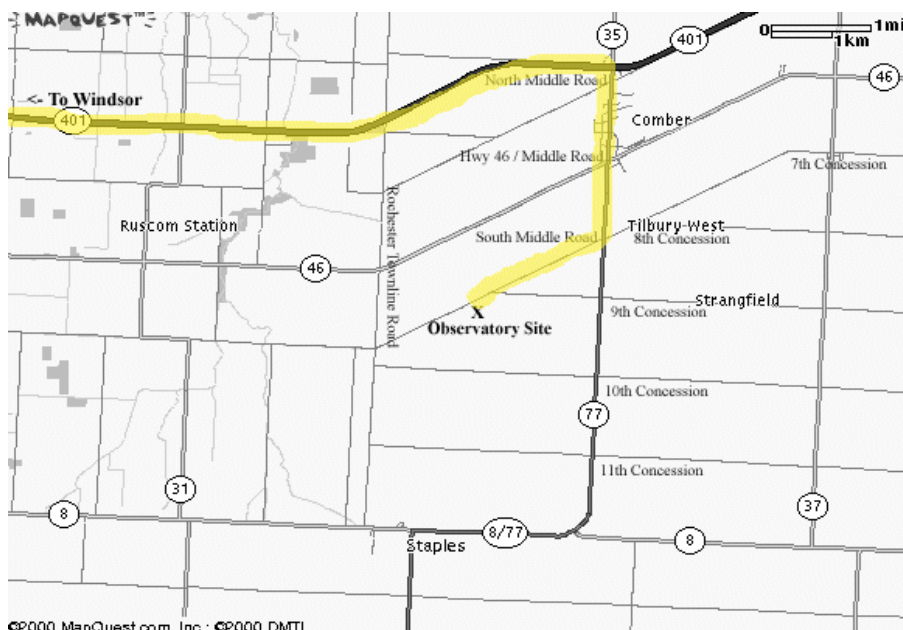
Astronomical Events:

June 21	Summer Solstice 2pm EDT
July 12	Venus at -4.7 magnitude
Aug 13	Perseid meteor shower
Aug 28	Total Lunar Eclipse
Sept 11	Partial Solar Eclipse
Sept 23	Autumnal Equinox 6am EDT

Observatory Open Houses:

SATURDAY	Start	Moon age
June 23	9:45 p.m.	9 days
July 21	9:30 p.m.	7 days
August 18	8:30 p.m.	6 days
September 15	8:00 p.m.	4 days

June28—July 1 GA in Calgary



Hallam Observatory Site

Directions: The map above shows the Comber area and it includes the major highways (401, 77, 8 and 46) that are in the area of the observatory.

The most direct route from Windsor is "highlighted" on the map which is to take 401 East to Highway 77 South to South Middle Road. While on South Middle Road you go about 1 kilometer and just after the barely discernable point where Concession 9 joins it you will find the observatory site on the South side of the road.

If you hit the Rochester Townline Road (i.e. you come to a stop sign and have to turn left or right) you have gone too far.

Submissions

Aurora is published monthly except for August. The October, December, February, April and June issues are full newsletters (usually 6 pages) with a number of member submitted articles. The November, January, March, May and July issues are short flyers (2 pages) with one short article. September is a dual issue with the full 6 page newsletter mailed just **before** the meeting and a flyer available **at** the meeting. Submitted articles can be of any length from a paragraph to multiple pages. I can scan pictures and/or diagrams (both prints and film) to support your article and the originals will be returned to you. Submission deadline is the 1st of the month.

Editor: Ken Garber
Ass't: Dan Anzovino

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Membership

The Windsor Centre of The Royal Astronomical Society of Canada meets on the 3rd Tuesday of every month (except July and August) at the K of C Maidstone Recreation Centre. In addition to regular meetings the centre hosts a number of observing nights, a picnic and a December social. Members receive a copy of the Observer's Handbook, the RASC Journal (optional at extra cost), a subscription to SkyNews magazine and access to the Centre's library and telescopes.

Annual Membership Fees are Regular - \$55.00, Youth - \$34.25 and Life - \$2100.00. **** NOTE New Rates ****

Contact Ken Garber at (519) 966-3478 or visit our website at: <http://www.mnsi.net/~rasc> for more information.

Meeting Minutes for May 15th as recorded by Dave panton

Chaired by Dr. Pierre Boulos

Visitors were made welcome and all thanked for attending. The April minutes were read, Harry Brydon made the motion for acceptance, Casey Masterson seconded and the motion carried.

Pierre recounted the most recent public events. Visits to Hallam by about 60 from King Edward school and up to 200 from the Windsor Mosque. At Point Pelee 16 or 17 Festival of Birds participants enjoyed talks by Pierre and Dan Taylor in the visitor centre and then observed the night sky in telescopes set up by members in the darkened parking lot.

Pierre thanked members for assistance and setting up their personal telescopes at these three events.

Main Presentation: Terry Couloumbe

Mine site selection on the Moon

Terry studied Computer Sciences as a student of Pierre's at the University of Windsor and is now in his fourth year of Earth Sciences. His presentation was based on his thesis.

First Terry gave an overview of Moon exploration to date. New ways to travel to and from the Moon with equipment, staff and return payloads utilizing Langrange points enroute were explained.

On the Moon there are many useful rocks and minerals to be mined and processed to obtain building materials, drinking water and near priceless Helium 3, easily transported to Earth.

Terry's interest is in developing computer programs to help find the best mine sites. The criteria are many and complex in such a formidable environment so far from Earth.

Utilizing a variety of programs, sometimes modifying them to suit the need, Terry showed how existing information and new data from the 2007/2008 lunar reconnaissance orbiters could be used to rapidly optimize mine site selections.

Many interesting questions followed and Pierre thanked Terry for his presentation.

Coffee Break and 50/50 Draw

Coffee break and the draw was held followed by a brief display of solar powered lights made for our observatory portable toilet.

Reports

Secretary: David Panton

Indicated minutes would be more brief.

Treasurer: Ken Garber

The bank balance stands at \$ 3623.82. We have gained two new members. Sky and Telescope magazine subscription renewals, discounted to members are now sent directly to S&T as they have our member data. New members should contact Ken to be added to the discount list. A box of Essex County library discard books are at Rick's desk for the taking.

Director of Public Education: Randy Groundwater (absent)

Pierre related stories of four most recent Windsor Centre events, thanking all who helped make them such a success.

- Sixty King Edward School grade six students visited Hallam.
- Approximately 120 members from the Windsor Mosque paid a visit to Hallam (our largest group to date).
- Our display at Earth Day, caught many people's interest.
- The Festival of Birds at Point Pelee this year had a new feature courtesy Windsor Centre, lectures by Pierre and Dan Taylor followed by an observing session from within the darkened Visitor Centre parking set with several member's telescopes.

Director of Public Relations: Tina Chichkan

Tina reminded us the June picnic would be held on Saturday June 16th and would feature a BBQ, pot luck supper and lots of games for children. She suggested a "mini star fest" at which participants would sit by a camp fire in the evening, do some observing and camp overnight. The idea was well accepted and may become an annual event. Steve Pellarin also proposed a "Space Port" for model rocket launches at the affair.

Light Pollution Abatement: Dan Taylor (absent)

Pierre encouraged all to use Windsor's 311 phone line to report new glaring lights. Lakeshore's pending lighting bylaws are still not before council. The International Dark Sky Association has accepted a paper from Dan Taylor for their 2007 convention in Quebec.

National Council Representative: Tim Bennett (absent)

Tim will represent Windsor Centre at the General Assembly in Ottawa June 28th through July 1st.

Observatory Director: Peter Bondy

No report

Monthly Hallam Observatory Open House Date:

Saturday May 19th 2007 9:45 p.m. everyone welcome, bring friends and family.

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Meeting Minutes for May 15th continued

Short Talk by Athan Tountas

Competing for a Model Space Elevator Prize Offered by NASA

Athan, a newly graduated Chemical Engineer from Sarnia joined a Toronto team to compete by building a model elevator designed to climb a 150 metre long suspended cable at a rate of at least 1 metre per second. Power must come from a remote source of either solar, micro-wave or laser energy.

Athan explained the principles of space elevators and how they could raise loads into space at low cost. His team, nicknamed "Punkworks" chose the microwave approach. They designed and built the elevator, its antenna and the microwave power transmission dish energized from a borrowed Cober Magnetron.

They hauled it all to the competition in New Mexico and found microwave power unexpectedly banned by local authorities. A Saskatchewan team topped the others with a solar powered elevator but fell slightly short of the climb rate target. Each year's Prize money will accumulate until it is won. Athan expects their team will try again in 2008 and requested support. Their website is www.punkworks.com.

Interesting questions of all kinds came from the floor, all capably answered by Athan. Pierre thanked him for telling us the story of his efforts in this unique contest.

Director of Observing this month: Steve Pellarin

Open house night will feature an unusually close Moon and Venus. Among the planets Jupiter will be a fine Summer target with its many moons and shadow transits, sometimes two at a time. Asteroid Vesta will become naked eye visible. We will also have comet Lovejoy for a few evenings. Steve also listed a variety of interesting targets always visible at this time of year.

Giving thanks to all for a great evening, Pierre adjourned the meeting at 10:21 p.m.

David J. Panton Recording Secretary



Solar Neutrinos (The Neutrino and its friends)

by Juliana Grigorescu

Neutrinos are one of the fundamental particles that make up the universe. They are also one of the least understood.

Neutrinos are similar to the more familiar electron, with one crucial difference: neutrinos do not carry electric charge. Because neutrinos are electrically neutral, they are not affected by the electromagnetic forces that act on electrons. Neutrinos are affected only by a "weak" sub-atomic force of much shorter range than electromagnetism, and are therefore able to pass through great distances in matter without being affected by it. If neutrinos have mass, they also interact gravitationally with other massive particles, but gravity is by far the weakest of the four forces.

Three types of neutrinos are known. Each type or "flavor" of neutrino is related to a charged particle (which gives the corresponding neutrino its name). Hence, the "electron neutrino" is associated with the electron, and two other neutrinos are associated with heavier versions of the electron called the muon and the tau (elementary particles are frequently labeled with Greek letters, to confuse the layman). The table below lists the known types of neutrinos (and their electrically charged partners).

Neutrino	ν_e	ν_μ	ν_τ
Charged Partner	electron (e)	muon (μ)	tau (τ)

As I am writing this paper roughly 10^{15} /s neutrinos pass through my body. They are so elusive (their mass is extremely small - 10,000 times less than the mass of the electron), that even this huge flux will not affect me anyhow.

Fusion reactions in the core of the Sun produce a huge flux of neutrinos. These neutrinos can be detected on Earth using large underground detectors, and the flux measured to see if it agrees with theoretical calculations based upon our understanding of the workings of the Sun and the details of the Standard Model (SM) of particle physics. The measured flux is roughly one half of the flux expected from theory. The cause of the deficit is a mystery. Is our particle physics wrong? Is our model of the Solar interior wrong? Are the experiments in error?

This is the so called "Solar Neutrino Problem."

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Solutions

Solutions to the solar neutrino problem are usually classified in one of two categories, astrophysical or physical.

Astrophysical Solutions

One way to solve the solar neutrino problem is to lower the central temperature of the Sun by a few percent. This will mean fewer high-energy nuclear reactions occurring in the solar core and thus, fewer neutrinos being produced and hence detected. There are a number of ways to lower the central solar temperature. Mixing will cause fresh fuel to be brought into the core, and thus a lower temperature will be needed to maintain equilibrium.

Physical Solutions

A current theory in particle physics states that it is possible for neutrinos to transform from one type to another. The **Mikheyev-Smirnov-Wolfenstein (MSW)** effect claims that electron neutrinos may transform or oscillate into either muon or tauon neutrinos. If these transformations take place in a vacuum, then they are called *vacuum oscillations*. Transformations taking place in matter are called *matter oscillations*.

Reactions involving solar neutrinos

How Does the Sun Produce Neutrinos?

The Sun produces energy by fusing hydrogen to helium. This may be accomplished in a number of ways but in the Sun, a process known as the **proton-proton chain** is thought to be primarily responsible for energy generation.

A Brief History of the Neutrino

1931 - A hypothetical particle is predicted by the theorist Wolfgang Pauli. Pauli based his prediction on the fact that energy and momentum did not appear to be conserved in certain radioactive decays. Pauli suggested that this missing energy might be carried off, unseen, by a neutral particle which was escaping detection.

1959 - Discovery of a particle fitting the expected characteristics of the neutrino is announced by Clyde Cowan and Fred Reines. This neutrino is later determined to be the partner of the electron.

1968 - The first experiment to detect (electron) neutrinos produced by the Sun's burning, led by Raymond Davis Jr. Using a liquid Chlorine target deep underground in the Homestake Gold Mine in South Dakota the team reports that less than half the expected neutrinos are observed. This is the origin of the long-standing "solar neutrino problem."

The possibility that the missing electron neutrinos may have transformed into another type (undetectable to this experiment) is soon suggested, but unreliability of the solar model on which the expected neutrino rates are based is initially considered a more likely explanation.

Raymond Davis Jr. and his experiment



Other experiments: SAGE in the former Soviet Union, GALLEX in Italy, etc....

1988 - Kamiokande, a water detector looking for proton decay but better able to distinguish muon neutrino interactions from those of electron neutrino, reports that they observe only about 60% of the expected number of muon-neutrino interactions.

1998 - The Super-Kamiokande collaboration announces evidence of non-zero neutrino mass at the Neutrino '98 conference.

2001-2002, scientists working at SNO, the Sudbury Neutrino Observatory in Ontario, Canada, found strong evidence that the neutrino has the ability to oscillate, or change form, among its three known types: the electron, muon and tau neutrinos, and **therefore resolving the "solar neutrino problem"**. SNO is also a water-Cerenkov detector. But, unlike Super Kamiokande, it contains heavy water. It is sited 2 km underground near Sudbury, in an active nickel mine.

Conclusions

Why are hundreds of physicists undertaking such difficult experiments in such hostile environments, with the most elusive elementary particles we know of?

Most of them are excited by the possibility of discovering the first definitive evidence that neutrinos have mass. The evidence of neutrino metamorphoses and of non vanishing masses is a crucial pointer toward a more comprehensive theory beyond the successful, but incomplete, "standard model" of the fundamental particles.

It is a matter of time (but how much?.....) until we will be able to fully understand neutrinos as particles...

>>> continued >>>

Juliana

A Little Fund Raising

Got any Canadian Tire money lying around that you'd like to get rid of?



Why not donate them to the Centre?

To date we've collected more than \$85 and of that, about \$65.00 has been spent on trees planted on the grounds, oil and gas for cutting the grass, chain lube for the dome and some bug spray.

Bring them along to any meeting and drop them off at the treasurer's table, and they will be put to good use.

Time to Renew ??

Don't forget that you can renew your membership at the treasurer's desk, by snailmail to the National, or online at the RASC 'store' at

<http://www.store.rasc.ca/>

And don't forget that the printed Journal is now optional extra. Look for the option on your form.

Time to Renew , too

If you are a subscriber of Sky and Telescope and have done your renewing through the Centre, you can now renew directly with S&T. You need not send your form and payment to the Centre.

If you are not a subscriber but wish to be, send your first payment to the Centre Treasurer for forwarding to S&T and you'll be able to renew directly after that.

For Sale

FOR SALE

6 inch **Meade Starfinder** Reflecting Telescope with Equatorial Mount. Package includes:

1 - Meade Multicoated 9mm eyepiece

1 - " " 12mm "

1 - " " 15mm Super Plossl eyepiece

1 - " " 25mm eyepiece

1 - 2x Telenegeative Amplifier (Barlow), 1 - Red flashlight, 1 - Instruction Manual

Price \$550.00 (new price)

If you are interested contact John Murray at 519-944-7052 or email at jmurray100@cogeco.ca

FOR SALE

Celestron Nexstar 114. It is 2 years old and only used once. Note this is a Goto computerized telescope and he is including a 25mm eyepiece.

Contact Alan King at 519-326-1361 or at jackall2@cogeco.ca

FOR SALE

Identiview 3 inch solar filter by J.M.B. Industies. \$150.00

Contact Ken Rounq at 519-738-3479

FOR SALE

Skywatcher reflector telescope in new condition having had very little use. It is a 150mm diameter tube and mirror and is 650 mm in length. It has 10mm and 25mm objectives with a 2x Barlow, a moon filter and a skylight filter. It is on an aluminum tripod with an equitorial mount and has a red dot finder scope.

Price - \$250.00. If interested, please contact Stuart Kelch by e-mail to skelch@cogeco.ca