

# AURORA



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The Royal Astronomical Society of Canada - Windsor Centre

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## The Brightness of Stars - The Magnitude Scale

The following article was suggested by Ken Garber. Ken provided a link to this article which is contained on David Haworth's web site: <http://www.stargazing.net/david/constel/magnitude.html>.

The brightness of a star is assigned a number starting with the brightest star at about -1 magnitude. Dimmer stars are zero or positive numbers. The larger the number means the dimmer the star is. For example, a star -1 magnitude is brighter than a star 0 magnitude. A star 0 magnitude is brighter than a star 1 magnitude. A star 1 magnitude is brighter than a star 2 magnitude. A star 4 magnitude is brighter than a star 5 magnitude. Magnitude sequence for stars starting with the brightest is -1, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 magnitude, ... etc.

The decimal point is not used when star magnitudes are used on a star map. The decimal point could be confused for a star on the map.

Historically the magnitude system started with Hipparchus and Ptolemy when they divided the stars into six magnitudes. About 20 of the brightest stars that they could observe from their location were assigned to the first magnitude. The next set of bright stars were assigned to second magnitude and so forth. Sixth magnitude stars were assigned to stars that were barely visible to the unaided eye under favorable conditions. Later it was determined that the ratio of first magnitude to sixth magnitude would be set to 100 to 1. A logarithmic scale of 2.512 between magnitude levels was implemented. For example, a first magnitude star is 100x brighter than a sixth magnitude star or the sixth magnitude star is 1/100 or .01x dimmer than a first magnitude star. Another example, a fifth magnitude star is 2.512 times brighter than a sixth magnitude star or the sixth magnitude star is 1/2.512 or .40x dimmer than a fifth magnitude star. This means that a star is 2.512 times brighter than a star one magnitude less.

With the invention of the telescope and modern equipment to measure star magnitudes the scale has been extended in both directions. Dimmer stars are assigned magnitudes larger than 6 (6, 7, 8, 9, ... 30th ... etc.) The Hubble Space Telescope Deep Field image contains some galaxies as faint as 30th magnitude. First magnitude stars were corrected across the scale of 1, 0, -1 with the brightest star Sirius at -1.44. The scale increases in brightness with negative numbers. For example, the brightest planet Venus varies in brightness and is about -4.4 magnitude at maximum brightness. The Moon is -12.7 magnitude at maximum brightness and the Sun is -26.75 magnitude.

The stars of Ursa Minor are handy to determine how faint of a star can be observed. On star maps bright stars are represented with large dots while dimmer stars are represented with smaller dots. The brightness of the stars of Ursa Minor get fainter starting with Polaris at 2.0 magnitude. The rest of the stars starting from bright to dim are 2.1, 3.1, 4.2, 4.3, 4.4, 5.0, 5.2 and 5.5 magnitude. Also note that Polaris is located in the same place in the sky throughout the year for each observing location. Because Windsor, Ontario is at north 42 degrees latitude Polaris is always located about half way between the point directly overhead (the Zenith) and horizon due north.

See magnitude chart on page 5.

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## Calendar of Events

### *Our next meeting...*

Tuesday June 16, 2009

7:30 p.m.

at

Maidstone K of C Hall

10720 County Road 34 (Old Highway #3)

### *Main Speaker...*

Randy Groundwater

### *Topic...*

“On Dark Matter”

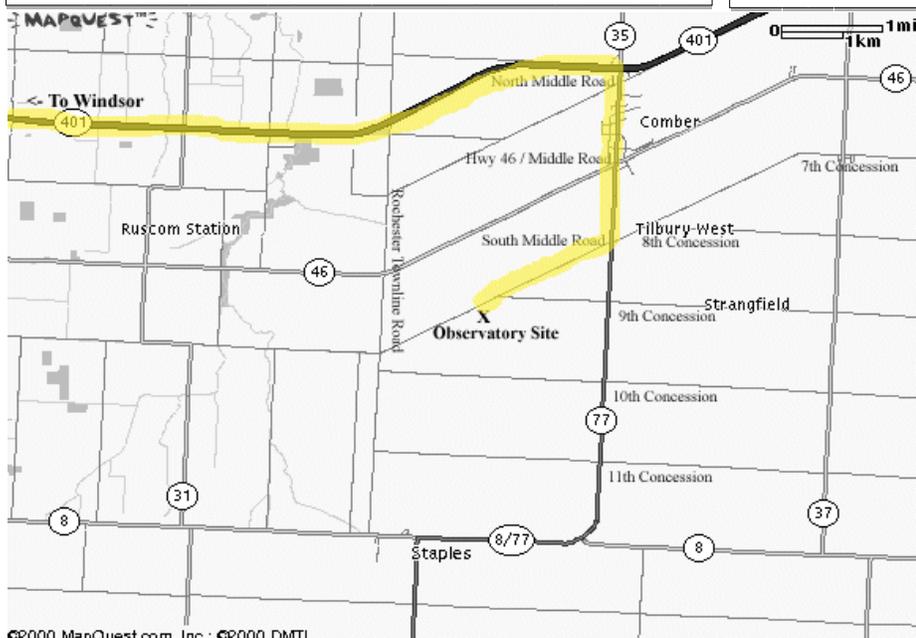
### *Activities...*

**Open House Nights at Hallam:** Since we are closing in on the Summer Solstice (June 21 at 1:46 a.m.) the open house nights begin at 9:30 p.m. for the next few months. The next open house nights are May 30 and June 27.

**Double Shadow Transit:** On Tuesday June 9th starting at 4:00 a.m. until sunrise watch the shadows of Ganymede and Io cross the disk of Jupiter.

**Council Meeting:** Tuesday June 9th at Randy Groundwater's house. Meeting begins at 7:30 p.m..

**Summer Picnic:** Saturday June 13th at Hallam Observatory. The format will continue to be a BBQ with the club providing the meat and you bring a side dish, drinks (no alcohol) and some lawn chairs. The picnic is open to members and their families.



### 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 Highway 401 East to Highway 77 South to South Middle Road. Turn right onto South Middle Road and go about 1 kilometer and just after the point where Concession 9 joins it (it is hard to see this intersection) you will find the observatory site on the South side (left) of the road.

If you hit the Rochester Townline Road (you come to a stop sign) you have gone too far.

## Submissions

Aurora is published monthly except for July and December. The August, October, January, March and May issues are full newsletters (usually 6 pages) with a number of member submitted articles. The September, November, February, April and June issues are short flyers (2 pages) with one short article.

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: Steve Mastellotto Email: mmastellotto@cogeco.ca  
Ass't: Dan Anzovino Email: danzovino@sympatico.ca

## 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, a subscription to SkyNews magazine and access to the Centre's library and telescopes. And optionally the RASC Journal in print form—online version free.

Annual Membership Fees: Please see the RASC website at [www.rasc.ca](http://www.rasc.ca) for current rates

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

## April 2009 Meeting Minutes by Dave Panton

Minutes from the meeting of April 21, 2009 held at the Maidstone Recreation Centre and chaired by President Dr. Pierre Boulos.

Pierre opened the meeting by having the minutes from the March meeting read and checked for errors or omissions. Greg Mockler made the motion to accept them, Ken Rount seconded and the motion carried. Pierre then asked for an introduction to our main speaker.

### Building a Very Large Dobsonian Telescope

Introduced to a full house, long time member Steve Pellarin and construction partner Mario Fabris occupied centre stage with their telescope construction project, brought in and set up for members to marvel at first it's huge size (roughly 3 feet in diameter and 9 feet long) and then the many difficulties to be overcome along the way.

Steve first introduced his partner Mario Fabris, giving him high praise for making the project possible by virtue of his extensive knowledge and experience in tool making and machine building. A retired VP of Canadian Engineering, Mario has a well equipped home machine shop and a long interest in astronomy. Mario inspired Steve at age 5 by showing him a star cluster in Virgo viewed in a 2 inch telescope. Over time Steve learned more about telescopes, astronomy and the virtues of having ever larger telescopes to see deeper and dimmer objects. Visits to Stellefane further inspired Steve to have his own very large telescope. Seeing astronomical objects colors and faint wispy details in large telescopes convinced him to acquire a 22 inch mirror from Mr. Steve Swayze in Oregon, a highly regarded (and very slow) mirror maker. One and a half years later, the mirror proved larger than his means to build a telescope at the time so it went on the block.

The ambition still burned and later Steve acquired a 28 inch f/3.614 mirror from another person in similar circumstances. This mirror was ground by Steve Kennedy in California, a very competent maker of short focal length large diameter mirrors. The short focal length keeps the telescope tube short so the observer is safely on or near the ground. Plans to build a telescope with the mirror were acquired from Howard Vanich also in California. At this point, Mario (Steve's Godfather) entered the scene with the experience, skills and equipment to build the mount. The plans needed some corrections and modifications to suit Steve's needs which included computer controlled motors to point and track the telescope. Together Steve and Mario solved all the problems along the way. The telescope's major components are finished and assembled. Completing the odds and ends remaining will come quickly. "First light" may come as soon as this Summer.

Pierre thanked Steve and announced **coffee break, 50/50 draw** and the opportunity to examine this very impressive telescope in detail.

Pierre **welcomed four new members**, Gary McLeod, Jim

Chambers, Barry Martin and Tom Bondy. Randy welcomed and introduced visiting 1970's past president Dr. David Toth.

### Reports

**Secretary, Dave Panton:** Dave reported all was in order.

**Treasurer, Ken Garber:** Ken reported a bank balance of \$5,150.46 and paid up membership is currently 101.

**Al DesRosiers** is holding another fund raising **garage sale** this Fall in aid of the Windsor Centre. Al asked members, their family and friends to hold salable items until sale time as his storage space is full.

**Librarian, Rick Marion:** Rick has another box of books for the observatory library.

**Newsletter Editor, Steve Mastellotto:** Steve needs articles and color photographs for the Aurora.

**Public Education, Randy Groundwater:** Activity at Hallam has been unusually high. The three consecutive open house events brought nearly 100 visitors, most on Saturday night. Many had already had a sampling of astronomy last year at the event held on the West Beach of Point Pelee. Randy showed photos of the attractive new Windsor Centre astronomy display, member's astrophotos and light pollution display set up at Windsor Library's Main Branch for the month of April. Library staff also set out a table filled with astronomy books. The displays will be circulated to other branches. Tom Sobocan did an astronomy presentation to the French Club.

**Public Relations, Tina Chichkan:** Earth Day this coming Sunday is an important event for RASC Windsor Centre and we have participated annually. Tina asked for member's help to set up and staff our display at Mic Mac Park and weather permitting, bring telescopes for a public observing event that evening.

**Light Pollution Abatement, Dan Taylor:** Dan was unable to attend the meeting. Steve Mastellotto reminded members that Dan's report is being published on the Windsor Centre web site as a monthly activity blog.

**Observatory Director, Dave Panton:** Dave described the effort made to save some of the night sky at Hallam by having the new 401 highway truck stop parking lot changed from wide open fixtures to the full cutoff type directing light down instead of the current lights, glaring light in all directions for miles and into the night sky. A wide variety of officials have been contacted including Sunoco, Esso, the MTO, MPP Bruce Crozier, Town of Lakeshore Mayor Tom Bain and the head of their building department. There is promise of change as it appears a new lighting plan is to be submitted by the original consulting engineering firm.

**Membership Chairperson, Paul Pratt:** Paul reminded mem-

*(Continued on page 5)*

## Hallam Happenings by Dave Panton

Spring has brought much nicer weather and Hallam has had lots of visitors and use by members most clear nights (and many very marginal nights too). Clear nights made it possible to spend enough time in the observatory to create a new "T-Point" model for the telescope pointing program. The T-Point manual is a mind boggling document so a short version was edited from it to simplify the task. Using the short version helped Al DesRosiers and I run our first solo mapping session. Steve Mastellotto did this in the past, sacrificing his valuable time on an otherwise boring task. Only 19 points in the sky surrounding our observatory were needed to vastly improved telescope pointing accuracy.

The new T-Point model also corrected the need to set the computer clock 51 seconds fast from the Atomic clock on start up. Set the computer clock against the Atomic clock on startup and enjoy pointing and tracking accuracy we have not seen in ages.

Rick Marion and Steve Mastellotto have been experimenting with their Orion CCD cameras with auto-guiding capability. When set up and running in either Steve's AT111 or the C14 they provide phenomenal tracking accuracy for long exposure astrophotography in the other.

The most difficult recent target is comet Cardinal. Many attempts were made to observe it after entering the orbital elements in the computer to have it point exactly to it's location. The comet turned out to be so faint it was barely possible for the keenest eyes to see it in the C-14. Photos were taken to prove the sighting.

Al has already mowed the grass and the observatory looks great outside and everything inside works properly.

May 5, 2009



**M81, 82 and NGC 3077** image by Steve Mastellotto on April 11. Image made with the AT111 at Hallam Observatory and is a single exposure of 3 minutes at ISO 1600 using Steve's new Canon 5D Mark II.



**Ring Nebula (M57)** image by Rick Marion on April 11. Image made with the C14 at Hallam Observatory and is a single exposure of 10 minutes at ISO 800. Rick used his new Canon 40D and the shot was autoguided through the AT111 with the Orion Deep Sky Shooter.

## The Brightness of Stars - The Magnitude Scale

Magnitude	Examples
-26	The Sun
-13	The Full Moon
-6	Crescent Moon
-4	Venus
-2	Jupiter
-1	Sirius, Totally eclipsed Moon
0	Vega
1	Saturn
2	Stars of Big Dipper
3	Faintest naked-eye stars visible from many smaller cities/inner suburbs
4	Faintest naked-eye stars visible from many smaller cities/outer suburbs
5	Moons of Jupiter
6	Uranus
7	Brightest asteroids and typically 1 or 3 comets per year
8	Neptune
10	Usually a comet visible at this magnitude level at all times
11	Limiting visual magnitude for comets using a 15cm telescope
12	Comets with a 20cm telescope
13	Comets with a 25cm telescope
14	Pluto at its brightest
15	Comets with a 50cm telescope
19	Limiting photographic brightness of comets with a 50cm telescope
21	Limiting brightness of stars with a 60cm telescope + CCD camera
22	Limiting brightness of comets with a CCD and a 150cm telescope

The table above was adapted from a more complete version located on the following web site: <http://www.cfa.harvard.edu/icq/MagScale.html>.

## April Meeting Minutes

(Continued from page 3)

bers of Canada Post's recently issued IYA 2009 commemoration stamp issue.

**Astrophotography at Hallam, Steve Mastellotto:** Steve made mention of astrophotography's growth at Hallam showing several photos by members shot in the C14 and AT111 telescopes. Visitors have also taken some very attractive night sky photos.

**International Year of Astronomy 2009, Mike Mastronardi:** Mike reviewed the immediate events and activities including the library display and Earth Day at Mic Mac Park. Later in the year the Pelee Island Winery Event, and Point Pelee International Park observing sessions will all count toward our IYA 2009 event total. Several Scout groups wish to earn their astronomy badges with the assistance of RASC Windsor Centre.

**Observer's Report, Juliana Grigorescu:** Juliana first quizzed members asking "What objects did Galileo observe?" Then she reviewed the status of observing the planets Mercury, Venus, Mars, Jupiter and Saturn. On Saturn Titan will cast it's passing shadow. Comet Lulin is observable in a telescope, while comet Cardinal from the Oort Cloud is very difficult. The Lyrid meteor shower and Venus/Moon conjunction are sights to observe in April. This is the time of year Zodiacal light can sometimes be observed under ideal conditions.

Pierre thanked Juliana for her report and adjourned the meeting at 10:25 p.m.

## Featured Web Sites

The Lunar Picture of the Day (LPOD) web site can be found at: <http://lpod.wikispaces.com/May+18%2C+2009>. The image below of Tycho was the LPOD for May 10, 2009. The image is by Christian Viladrich and was taken on August 24, 2008 at 4h 07m UT. Christian used a Celestron 14 at F/19 (extender QX1.6 Takahashi) + Skynyx 2.1M video camera, 1000 images, Astronomik red filter.



The Astronomy Picture of the Day (APOD) web site can be found at: <http://antwrp.gsfc.nasa.gov/apod/astropix.html>. The image below of the Moon and Venus conjunction (occultation from Western Canada and U.S.) of April 22 was the APOD for April 24, 2009. Even through clouds, both show off a lovely crescent in this photo by David Cortner from Rutherford College, North Carolina.



## Earth Day 2009

On Sunday April 26th the RASC—Windsor Centre participated in the Earth Day activities at Mic Mac park. This was a special Earth Day for astronomy since the International Year of Astronomy 2009 was the central theme at the event. As you can see from the pictures below our newly revamped display boards were a big part of our display as were the telescopes on hand for safe solar viewing. The new T-shirts featuring the Hallam Observatory were worn by a number of members and were available for sale. A big “thank you” to everyone who helped with set up, by bringing telescopes or just being on hand to answer questions. *Photo credits go to Rick Marion.*

