



**SKASKATOON** November 1982

**SKIES**

Volume 12

Number 11



★ Membership Dues ★

for 1982-1983

should be paid at the  
December General  
Meeting.

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# SASKATOON SKIES



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**November 1982**

**Volume 12**

**Number 11**

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**PRODUCTION** - Len Herrem, Joan Badger, Pat Nelson.

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SASKATOON, Saskatchewan  
S7N 0W0

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## THE TOTAL LUNAR ECLIPSE OF DECEMBER 30, 1982

M. Wesolowski

On the morning of Thursday, December 30, observers will have the opportunity to see a total eclipse of the moon, the third one this year, and the second one visible from North America. Not until April, 1986 will there be an opportunity for North Americans to see a total eclipse of the moon after this one. The only other observable eclipse this year occurred in July and was mostly clouded out for observers in the Saskatoon area.

The geometry of a lunar eclipse is quite simple, if details of orbital motion are ignored. The sun, Earth and moon must be aligned as shown in Figure 1. When the moon is in the penumbra, an observer there would see the sun partially obscured by the Earth, ie. a partial solar eclipse. When the moon is in the umbra, the observer sees a total solar eclipse. Because the Earth is larger in the moon's sky than the moon as seen from the Earth, a total eclipse as seen from the moon lasts for a much longer period of time.

The presence of the Earth's atmosphere adds an interesting wrinkle to the problem, acting as a weak lens to focus some of the sun's light on the moon. Since the sun is actually below the Earth's horizon as seen from the moon, its light is reddened considerably by the passage through the Earth's atmosphere (think about how red the sun gets when it is near the horizon). This results in the reddish-orange coloration typical of the eclipsed moon.

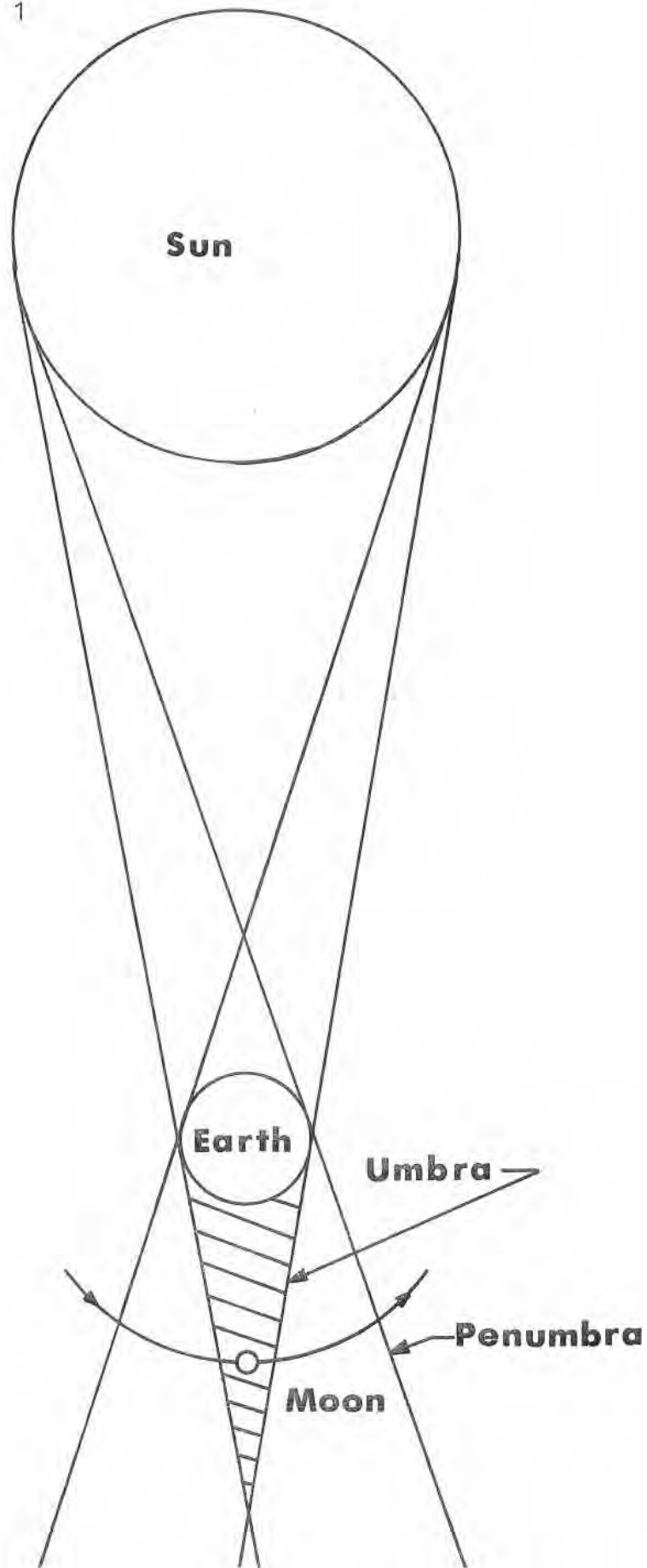
The circumstances of this eclipse are somewhat different from those of last July's eclipse. First of all, the moon is passing well north of the center of the Earth's shadow. As well, it will be at perigee and moving quite quickly in its orbit. These two factors combine to make the total phase of this eclipse quite short, only 61 minutes.

The times of the various phases of the eclipse are as follows:

December 30, 1982	Beginning of Penumbral Eclipse	02:52 AM CST
	Beginning of Umbral Eclipse	03:50 AM CST
	Beginning of Totality	04:58 AM CST
	Mid-Totality	05:29 AM CST
	End of Totality	05:59 AM CST
	End of Umbral Eclipse	07:07 AM CST
	End of Penumbral Eclipse	08:06 AM CST

It should be noted that no change in the appearance of the moon will be seen for about 30 minutes after the beginning of penumbral eclipse and about 30 minutes prior to the ending of penumbral eclipse.

FIGURE 1



## VISUAL OBSERVATIONS

For visual observations of the eclipse, it is recommended that you use either the unaided eye, or a low power telescope. Binoculars and a reclining lawn chair are ideal, especially since the moon will be quite high in the sky. Several possibilities for observations exist. A casual observer may wish to relax and enjoy the spectacle. Those with artistic ability might wish to attempt to record the appearance of the moon at various phases of the eclipse. Others might want to attempt photography (see following article). A visual observing project that can be carried out by anyone is to make estimates of the brightness of the moon during totality using a five-point scale devised by the French astronomer A. Danjon:

- L = 0: Very dark eclipse. Moon almost invisible, especially at mid-totality.
- L = 1: Dark eclipse. Gray or brownish coloration, details distinguishable only with difficulty.
- L = 2: Deep red or rust-colored eclipse, with a very dark central part in shadow, and the outer edge of the umbra relatively bright.
- L = 3: Brick-red eclipse, usually with a bright or yellow rim to the shadow.
- L = 4: Very bright copper-red or orange eclipse, with a bluish very bright shadow rim.

Estimates should be made to the nearest whole number, and the time of the observation should be recorded. It is of interest to make these observations at the beginning, middle, and end of totality to see how the brightness of the moon changes as it moves through the Earth's shadow. The author is interested in receiving all observations made; they can be sent to the address given at the end of this booklet.

A lunar eclipse is not the spectacular event that one experiences with a solar eclipse, but it can be just as much a photographic challenge since the range of brightness is so great.

For a start, the Moon is an object that reflects sunlight, hence the use of the exposure formula applies, ie.,

$$T = \frac{f^2}{ASA \times B} ; \text{ where } , f = \text{speed of the camera or telecamera system,}$$

T = exposure time in seconds,

ASA = ASA speed of film, and

B = The object's brightness.

Values for f, and ASA can be readily determined, but the value for B is not so easy to find. By trial and error, the following values are accepted for the lunar B:

Full Moon = 220; Half Moon = 40; Quarter Moon = 17;  
New Moon = 5; Penumbra = 20; and Totality = 0.005.

During a lunar eclipse, the Moon is lit by sunlight that passes through the Earth's atmosphere, and similar to the dawning and sunset effect, the Moon will tend to turn quite red or coppery. It is this 'coppery' effect coupled with the silvery tones of light along the lunar edges, determined by where in the umbral shadow the Moon is traversing, that makes each lunar eclipse unique and beautiful.

Now for some times. First let me suggest the use of a fast color film, preferably Fujichrome RH400, as this slide film reproduced the red tones excellently, and will undergo short time exposures without reciprocity failure.

The following times are based on the use of RH-400:

Full Moon, B = 220, f/16, T 1/250-500th of a second:

Half Moon, B = 40, f/8, T = approx 1/250 second

Quarter, B = 17, f/8, T = 1/60 - 1/125 second

Totality, B = 0.005, f/2.8, T = about 4 seconds

As can be seen from the above figures, a time-exposure is necessary, and can only be successfully accomplished

with the aid of a good sturdy tripod. Better still, if the camera can be mounted on a driven telescope, the picture will be quite clear and show no movement.

It should be noted that figures given are idealistic, ie, assuming good clear weather and sky, with no pollution. These conditions seldom happen, so be prepared to bracket your photos to taken Mother Nature and Murphy into account.

Another technique, if you have a spare camera and tripod, with the camera fitted with a wide angle lens, is to take the entire eclipse on one single frame. Mount the camera on a rigid tripod and orient it so that the path of the Moon will remain within the entire frame. Lock the camera in this position, and leave it there during the entire eclipse. Take a picture every 15-20 seconds, adjusting speed and f/number as necessary, re-cocking the shutter without advancing the film. The result, if taken properly, will be an entire eclipse on one slide - truly a beautiful sight that one can be proud of taking.

If you will be taking pictures through a telescope, use the same "B" numbers given earlier, and recalculate your revised exposure times for your own "f" numbers and film types.

G O O D L U C K

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The Saskatoon Centre of the Royal Astronomical Society of Canada welcomes all eclipse observations, whether visual or photographic. Visual observations should include the time of the observation (to whatever accuracy is required) and the instrument used. Photographic observations should include additional details concerning exposure, film used, etc.

Mailing address:

The Royal Astronomical Society of Canada  
Saskatoon Centre  
Sub P.O. No. 6, Box 317  
Saskatoon, Saskatchewan  
S7N 0W0



# NEWSLETTER

**Mailing Address:**

The Royal Astronomical Society of Canada  
Saskatoon Centre  
Sub P.O. No. 6, Box 317  
SASKATOON, Saskatchewan  
S7N 0W0

## Members of the Executive Council

Honourary President: Dr. Ray Skinner  
Past President: Gordon Patterson  
President: Mike Wesolowski  
Vice-President: John Greer  
Secretary: Lillia Wilcox  
Treasurer: Mike Williams  
Librarian: Joan Badger  
Activities: Walter Fernets  
Programming: Ron Waldron  
Centre Rep: Jim Young  
Editor: John Greer  
Councillors: Len Herrem, Patrick Skinner, Tarek Fahmi,  
Gordon Mack, Doug Miller, Richard Huziak.  
Rystrom Complex Committee: John Greer, Mike Wesolowski  
Merlyn Melby, Gordon Patterson

## Notice of Meeting

Room B111, Health Sciences Bldg. U of S Campus  
**Place**.....  
**Date** December 20, 1982 (Day) Monday.....  
**Time** 8:00 p.m. (Central Standard).....  
**Purpose** December General Meeting.....  
**Program** The Ends of the Universe, an illustrated  
talk by Mike Wesolowski.....

NEWS RELEASE

THE FATE OF THE UNIVERSE

Astronomers are reasonably certain about how the universe as we know it today, began, but cannot yet make a definite statement about how it will end. Will the end come with a bang or a whimper? Ironically, the ultimate fate of our universe, the largest "object" we can conceive of, depends upon the characteristics of certain sub-atomic particles, the smallest bits of matter in the universe.

The general public is invited to attend the next General Meeting of the Saskatoon Centre of the Royal Astronomical Society of Canada, when Mike Wesolowski, President of the Centre, will present an illustrated talk entitled "The Ends of the Universe". Topics to be discussed will include current ideas on the creation of the universe, and how new developments in nuclear physics affect ideas about how the universe will end.

MONDAY, DECEMBER 20, 1982  
8:00 PM  
ROOM B-111, HEALTH SCIENCES BUILDING  
UNIVERSITY OF SASKATCHEWAN

The meeting will adjourn to the U of S Observatory for coffee and viewing through the 7" telescope, weather permitting. There is NO ADMISSION CHARGE. New members are welcome. For further information, contact John Greer, 664-2933.

Please display, publish or broadcast this news release/public service announcement on behalf of the Saskatoon Centre of the Royal Astronomical Society of Canada.  
John Greer, Vice President.

*John Greer*

# NEWSLETTER

**Mailing Address:**

The Royal Astronomical Society of Canada  
Saskatoon Centre  
Sub P.O. No. 6, Box 317  
SASKATOON, Saskatchewan  
S7N 0W0

## Members of the Executive Council

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Gordon Mack, Doug Miller, Richard Huziak.  
Rystrom Complex Committee: John Greer, Mike Wesolowski  
Merlyn Melby, Gordon Patterson

## Notice of Meeting

**Place** Room B111, Health Sciences Bldg., U. of S. Campus

**Date** November, 15, 1982 (Day) Monday

**Time** 8:00 p.m. (Central Standard)

**Purpose** November General Meeting

**Program** Ron Waldron "Reflections of a Planetarium

Intern"

# MINUTES OF AN EXECUTIVE MEETING

Saskatoon Centre of the Royal Astronomical Society of Canada

PLACE - - - Observatory, U of S Campus  
DAY/DATE - Monday, October 18, 1982

TIME - 7:00 p.m. C.S.T

Present: Gordon Patterson, Mike Wesolowski, Jim Young,  
Mike Williams, Patrick Skinner, Lillia Wilcox,  
Walter Fernets, Joan Badger, John Greer.

<u>ITEM</u>	<u>DETAIL</u>	<u>ACTION</u>
128.	Meeting called to order 7:05 pm CST.	G. PATTERSON
129.	Motion to be presented at General Meeting concerning insurance of Rystrom Complex.	MIKE WILLIAMS
130.	Possibility of exchange speakers with Edmonton and Winnipeg was discussed.	G. PATTERSON
131.	Discussion of bringing up to date the binding of Sky and Telescope magazine.	JOAN BADGLR

# MINUTES OF A GENERAL MEETING

Saskatoon Centre of the Royal Astronomical Society of Canada

PLACE - - Room B111, Health Sciences Bldg.  
DAY/DATE - Monday, October 18, 1982

TIME - 8:00 p.m. C.S.T

Present: Gordon Patterson, Mike Williams, Jim Young,  
Patrick Skinner, Lillia Wilcox, Walter Fernets,  
Joan Badger, John Greer.

<u>ITEM</u>	<u>DETAIL</u>	<u>ACTION</u>
132.	Meeting called to order 8:00 pm CST.	G. PATTERSON
133.	September minutes adopted as published. WENDEL FRENZEL JIM YOUNG	G. PATTERSON CARRIED
134.	Increase of membership fees due to increase in cost of newsletter; Adult- \$25.00 Youth- \$17.50	G. PATTERSON



- |      |  |                          |
|------|--|--------------------------|
| 135. | It was moved that a disbursement of \$173.00 be made for insurance for the Rystrom Complex.<br>JOHN GREER<br>JIM YOUNG                                     | MIKE WILLIAMS<br>CARRIED |
| 136. | The possible exchange of speakers with the Edmonton and Winnipeg Centres was discussed.  | G. PATTERSON             |
| 137. | It was moved that up to \$30.00 be disbursed for the binding of Sky and Telescope issues.<br>TEREK FAHMI<br>WALTER FERNETS                                 | JOAN BADGLER<br>CARRIED  |
| 138. | The Centre Service Award was presented to Wendel Frenzel for his years of devoted service to the Centre. The award is sponsored by Alpha Graphics limited. | JOHN GREER               |
| 139. | The executive council for 1982-83 was elected by acclamation.<br>WENDEL FRENZEL<br>EVELYN DAVIS  | G. PATTERSON<br>CARRIED  |
| 140. | Meeting adjourned to observatory 8:30 pm CST   | G. PATTERSON             |

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## AROUND THE CENTRE

A Résumé on the Activities of the Centre

Walter Fernets

On the night of September 11, John Greer, Dave Barrie, (member of the Regina Astronomical Society) and I gathered at the Rystrom Observatory to view through Dave's newly acquired 40mm TeleVue Flössl eyepiece. John set up his C-90 and we proceeded to view some of the familiar deep sky objects.

The first to be examined was M31, the Andromeda Galaxy. While the C-90 could not be regarded as a large aperture instrument, the view of M31 with the 40mm was spectacular. The star images were crisp and the field of view almost wide enough to see the two companions NGC 205 and NGC 185 along with M31. The scene through the telescope was better than what was anticipated by all present.

Second to be scrutinized was the double cluster in Perseus. This was one of the best views I have seen. Pinpoint star images along with the wide field of view were the primary reasons. Two glowing clusters against a black velvet sky, excellent.

The observation of M13, the globular cluster in Hercules was superb. The cluster appeared as a glowing ball surrounded by what seemed a myriad of stars.



The telescope was then moved to Lyra and M57, the Ring Nebula was in the field of view. As before, the view was better than expected, however, the smaller aperture was noticed in that our memories held the view obtained through larger telescopes.

Observation of M45, the Pleiades once again demonstrated the advantages of an excellent eyepiece coupled with compatible optics. The picture presented was exquisite.

All present agreed the evening was well spent and left two Centre members knowing what eyepiece they will in the future endeavor to acquire.

-----

The grinding of the Centre's 16" mirror is progressing smoothly. Doug Miller, Mike Wesolowski and Rick Huziak have managed to use a milling machine in the Linear Accelerator building on the U. of S. Campus to perforate the mirror.

Mike reports work is slow as the "biscuit" cutter takes time to move the abrasive down to the grinding surface. He estimates a further 8 to 10 hours with the cutter is needed to arrive at the necessary depth before further grinding of the mirror's surface could commence.

-----

Eetook, the Centre's 12" Dobsonian telescope is to receive a two inch focusing mount. This will enable superb views of deep sky objects possible as the viewing through two inch eyepieces will be comfortable as the eye relief is excellent.

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# MINUTES OF AN EXECUTIVE MEETING

Saskatoon Centre of the Royal Astronomical Society of Canada

PLACE - - - U of S Observatory, U of S Campus

DAY / DATE - Monday, November 15, 1982

TIME - 7:00 p.m. C.S.T

Present: Mike Williams, Mike Wesolowski, Jim Young, Lillie Wilcox, Patrick Skinner, Tarek Fahmi, Len Herrem, Joan Badger, John Greer, Gordon Patterson.

1. Meeting called to order 7:10 pm Mike Wesolowski
2. The Insurance premium for the Rystrom Complex has been paid, as per Minute 135/1982. Mike Williams
3. Information has been received from the National Office about the reappearance of Halley' Comet Mike Wesolowski
4. We are now awaiting approval from National Office regarding our request for a travel grant for our speaker exchange with the Edmonton Centre. Mike Wesolowski
5. Progress on the grinding of the 16-inch mirror was discussed. Mike Wesolowski
6. A correction to the Minutes listed in the September Newsletter - Item 118 should read "June" minutes rather than July-August minutes. Mike Wesolowski
7. The Editor stated that material for the Newsletter was urgently needed. John Greer
8. The Treasurer pointed out that Memberships and any renewals were due. All this information has to be sent to the National Office by January 1, 1983 Mike Williams

The Executive Meeting then adjourned .

# MINUTES OF A GENERAL MEETING

Saskatoon Centre of the Royal Astronomical Society of Canada

Room B111, Health Sciences Bldg. U of S Campus

PLACE - - - Monday, November 15, 1982

8:00 p.m. C.S.T  
TIME -

DAY/DATE -

Executive Members Present: Mike Williams, Mike Wesolowski, Jim Young, L. llia Wilcox, Patrick Skinner, Tarek Fahmi, Len Hersem, Joan Badger, John Greer, Gordon Patterson, Doug Miller.

9. The meeting was called to order at 8:00 pm Mike Wesolowski
10. A motion was requested to adopt the October, 1982 Minutes as published. Proposed - Gordon Patterson  
Seconded - Tarek Gahmi  
CARRIED
11. The President noted that the October National News-  
-letter carried the details of the Quebec General Assembly Observing Competition details Mike Wesolowski
12. The President advised all present that membership fees were due no later than the December General Meeting, December 20, to ensure members receive their Newsletters and Journals. Mike Wesolowski
13. Members were advised of the correction to the October Minutes, Item 118, to read "JUNE" vice July-August Mike Wesolowski
14. Members were advised the 1983 Observer's Handbooks were available to paid-up members. Mike Wesolowski
15. Cutting the central core of the 16-inch mirror is still in progress. Mike Wesolowski
16. The Editor advised all present that articles for future Centre Newsletters were urgently required. John Greer
17. An illustrated talk was given by Ron Waldron on his experiences as a planetarium Intern at Winnipeg. Ron Waldron
18. The meeting was adjourned to the Observatory 9:20 pm Mike Wesolowski.



The Royal Astronomical Society of Canada  
 Saskatoon Centre Incorporated  
 Income & Expenditure - September 30, 1982  
 (with comparative figures for 1981)

	<u>1982</u>	<u>1981</u>
<b>Income :</b>		
Membership Fees	\$ 790.00	\$ 820.00
Life Member Grants	32.00	19.20
Donations	1,426.22	443.37
Educational Activities	-	21.00
Newsletter Subscriptions	289.00	248.00
General Assembly	8,281.13	-
National Grant (16" telescope)	1,000.00	-
Interest	<u>53.31</u>	<u>-</u>
<b>Total Income</b>	<b>\$ 11,871.66</b>	<b>\$ 1,551.57</b>
 <b>Expenditure :</b>		
Educational Activities	\$ 105.00	\$ 41.06
Fees to National Office	498.00	511.20
General Assembly	7,266.58	-
Office Administration	36.24	188.18
Newsletter & Postage	267.18	188.51
Subscriptions	38.50	16.50
Insurance	165.00	165.00
Observatory	<u>16.34</u>	<u>-</u>
	<b>\$ 8,392.84</b>	<b>\$ 1,110.45</b>
Surplus on Operations before amortization	3,478.82	441.12
Amortization- Buildings @ 20 years	<u>570.14</u>	<u>547.25</u>
<b>Net Surplus for Year</b>	<b>\$ 2,908.68</b>	<b>\$ (106.13)</b>

On Behalf of the Executive :

S. J. Peterson President

M. Williams Treasurer

A. Williams Auditor

The Royal Astronomical Society of Canada  
 Saskatoon Centre Incorporated  
 Balance Sheet - September 30, 1982  
 (with comparative figures for 1981)

	<u>1982</u>	<u>1981</u>
<b>Assets :</b>		
Current Assets;		
Bank	\$ 421.25	529.50
Savings (Telescope Fund)	2,668.98	-
Petty Cash (Treasurer)	23.00	-
Fixed Assets @ cost;		
Rystrom Observatory	\$ 4,642.13	4,642.13
Warmup Shelter	3,746.27	3,746.27
Underground Wiring	3,015.06	2,557.35
Storage Shed	<u>652.99</u>	<u>228.89</u>
	12,056.05	11,174.64
less accumulated amortization	<u>1,818.24</u>	<u>1,248.10</u>
	10,238.21	9,926.54
Library	1.00	1.00
Equipment	<u>1,443.91</u>	<u>1,394.13</u>
Total Fixed Assets	\$ 11,683.12	11,321.67
Prepaid Subscriptions	<u>22.00</u>	<u>16.50</u>
	<u>\$ 14,818.35</u>	<u>\$ 11,867.67</u>
 <b>Liabilities &amp; Equity :</b>		
Liabilities;		
Prepaid Membership	\$ 50.00	-
Prepaid Subscriptions	<u>16.00</u>	<u>24.00</u>
	66.00	24.00
Equity;		
Surplus October 01, 1981	\$ 11,843.67	11,949.80
Surplus September 30, 1982	<u>2,908.68</u>	<u>(106.13)</u>
Total Equity	<u>14,752.35</u>	<u>11,843.67</u>
	<u>\$ 14,818.35</u>	<u>\$ 11,867.67</u>

# THE CENTRE LIBRARY

## BOOK REVIEW

Patrick Moore's newest book, The Unfolding Universe, is a fairly generalized narrative of the space program from the first attempts to the present. While it includes much material previously covered in other publications, Mr. Moore offers his views on some of the speculations that are being made, and reviews the data that has just been received from the Viking probes to Jupiter and Saturn. Much of it is from on-the-scene observation as the data and photographs were being received. Lavishly illustrated, Mr. Moore's book also describes many of the world's observatories that he has visited. As well, it discusses the latest data about the radio sky, the sun, and the stars, and gives his views on the direction that the space program is likely to take in the next twenty-five years.

The Unfolding Universe is written by a professional astronomer with many years of television broadcasting and many books on space and astronomy to his credit. The book is non-technical enough to be easily understood and is immensely interesting to very new amateur astronomers. However, it should prove entertaining to those with more experience in astronomy as well. The book is currently available at the Saskatoon Public Library.

Phil Sparks

## PHOTOELECTRIC PHOTOMETRY PROGRAMS: GENERAL CONSIDERATIONS

Photoelectric photometry - by amateurs or professionals - can contribute significantly to astronomical research. Make sure your program is scientifically worthwhile.

Amateurs can make an especially valuable contribution by making systematic observations over a long period of time: months and years.

Photoelectric photometry should be enjoyable as well as satisfying. Don't forget what the word "amateur" means.

Consult with the AAVSO, the IAPPP or your local professional astronomer for advice in choosing a program and carrying it out.

There are definite advantages to working with a group, on an established program or campaign. You get more feedback that way.

Choose a program which fits your equipment, site, ability and time available.

Even if your site is mediocre, a few well-chosen observations in a night are quite worthwhile. Choose stars with relatively long periods.

It may be difficult for the program co-ordinator to combine observations of one star by very many observers, especially if they have not all been careful in correcting and transforming their observations. Consider "adopting" a few stars and observing them regularly.

Don't over-extend yourself. Bite off something you can chew.

Strive for the greatest accuracy you can attain, by making your observations carefully and correcting carefully for extinction, gain settings and color effects.

Don't observe on cloudy nights. A dubious observation is worse than no observation at all.

Computer acquisition and reduction of data is acceptable, but is no substitute for careful observation.

If your sky is non-uniform or otherwise imperfect, concentrate on differential photometry, with comparison stars close to the variable.

If your telescope is small, your photometer insensitive or your sky bright, stick to bright stars. There are over 1000 stars in the Bright Star Catalogue which require photometry. See my article "Microvariables" for further information.

Don't observe variables and comparison stars of different colors unless you are sure of your transformation coefficient.

Don't observe variables and comparison stars on different gain settings unless you are sure of your gain setting calibrations.

If you are really confident of your equipment, your sky and your data reduction procedures, you might want to try absolute photometry. Many of the comparison stars on the various AAVSO charts are in need of accurate magnitudes and colors.

For many purposes, it is adequate to observe in one filter only: usually V.

Follow standard procedures for reducing data: correcting for extinction, color effects and gain settings.

You will get more satisfaction from your observations if you see them published or made available to the astronomical community. Make sure that this is being done.

Observe at least two comparison stars,  
and calculate and publish  $\Delta m(C1-C2)$ .

Keep detailed, adequate records.

John R. Percy  
Department of Astronomy  
University of Toronto  
Toronto, Canada M5S 1A7



An Anonymous Student

One of the most amusing aspects of marking Physics Labs dealing with astronomy are the distortions of facts that creep (gallop!) into a writeup, through misinterpretation of the spoken or written word.

The paragraph below is a copy of part of one student's write-up on the Milky Way galaxy, based on one of the displays in the basement of the University of Saskatchewan Observatory.

"Concentrations of gas and dust are galactic nebulae while inside the stars there are emission nebulae; the cooler stars shine by reflected light and so are reflection nebulae. All of the above make up one of the most beautiful galaxies in the solar system."

...contributed by Mike Wesolowski

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