

# SPECTRUM

Northern Cross Science Foundation Newsletter

November 1999

## LOOKING UP

Nov. 4 Thursday  
Astronomy 101  
7:00 PM  
General Meeting  
8:00 PM  
Carlson Tool & Mfg.

Dec. 2 Thursday  
Astronomy 101  
7:00 PM  
General Meeting  
Christmas Party  
8:00 PM  
Carlson Tool & Mfg.

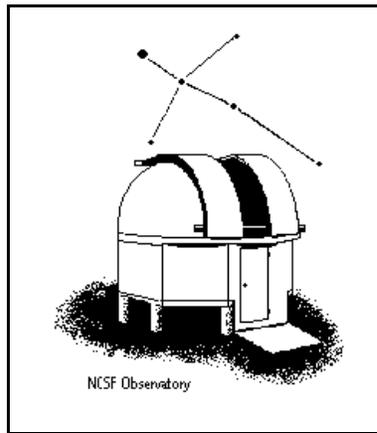
## Observatory for sale?

by Kevin Bert

It is not yet official, but the NCSF Observatory may be up for sale in the very near future. The club has struggled for years to find a new location to relocate the building so as not to continue imposing on Mr. Zarling. It was designed to be disassembled for a possible move at some future date. Plans for a larger structure to house the 20 Inch Panarusky telescope have again placed moving the 16' dome on the back burner. This last year was the first time that no public event was scheduled for the dome.

Over the last few years attendance by the public has declined, even on nights

that were clear. The focus of the club has turned to bringing telescopes to the people instead of having the public come to us. Light pollution has compromised the usefulness of the dome where it is now to add to the lack of use by members. The old 12.5" Newtonian that was housed in the dome, is being re-conditioned to be used as a portable telescope. For now, the observatory currently sits empty.



Rudy Zarling has asked the NCSF Board to make an extra effort to see to it that the observatory is moved ASAP.

(See **SALE** on page 3)

## A Short History of the Telescope Part 2

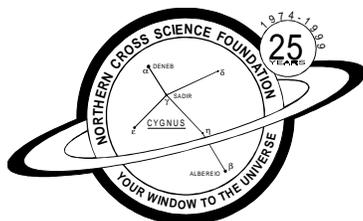
From Lake County Astronomical Society <http://www.bbso.njit.edu/>

By the late 1800's, optical glass for large Refractor lenses had improved markedly. Several telescope makers had achieved renown for the quality of their instruments -- they included the famous names of Clark, Brashear, and Mogyey. Most major discoveries before the 20th century were made using refractors. For example, it was with the Lick 36" refractor that E. E. Barnard discovered the fifth moon of Jupiter in 1892, at last expanding beyond the four originally found by Galileo. As late as 1930, Pluto was discovered with the Lowell Observatory 13-inch refractor. The epitome was reached with the 40-inch at Yerkes Observatory, which was completed in 1897 and housed in a dome 90 feet in diameter. Alvan Clark, who made the 40-inch lens, felt that a still larger re-

fractor would be impossible because the weight of the glass would cause the lenses to sag and lose their figure. Unlike a mirror, a lens can only be supported around its circumference.

But the Yerkes telescope was not the largest refractor ever built. The largest was constructed for the Paris Exposition of 1900. It had a 49.2-inch objective with a focal length of 187-feet. With this focal ratio (f/45.6), the *lowest* magnification was 500x! Even its mounting was unconventional. It was mounted horizontally using a siderostat mirror of 79-inches to feed the object to the primary lens. Focusing was done by means of a carriage on rails, with a focus travel of 5 feet. But

(See **History** on page 2)



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# October Minutes

By Kevin Bert

The October meeting of the Northern Cross Science Foundation was held in the conference room of Carlson Tool & Mfg. in Cedarburg. The Astronomy 101 class preceded the business meeting.

Vice President Dan Prosser opened the meeting at 9:00 p.m. to over 14 people.

Dan asked for standard reports.

Brad Plaumann reported little activity in the club checking account. He gave the current balance in all accounts. Kevin Bert commented on the newsletter briefly. He reported that there was no activity on the 20 Inch Panarusky telescope.

Dan talked about last months events and went over upcoming events for October.



Under new business Henry Paque thought that some of the newsletters could be sent electronically to members of the club to save printing and postage costs. A discussion followed on how feasible it might be. Kevin Bert said that he would look into the possibility.

The business meeting was closed by Dan Prosser at 9:34 p.m.

Respectfully submitted,  
Kevin Bert, secretary

*(History from page 1)*

the results were poor, owing to a bad location and a steel tube with no ventilation. The telescope would not fit under a conventional observatory dome and after the year-long exposition was over, its builders were unable to sell it to any institution. The telescope was ultimately broken up for scrap.

The later history of the telescope certainly belongs to the reflector. By 1900, most astronomers preferred reflectors for their ability to be made quite large, thus providing much more light gathering. As they probed the edge of the universe, it became clear that the future of astronomy would be tied to the reflector. However, there were still some problems. By the 1850's, speculum metal mirrors had been abandoned in favor of glass, but plate glass was unstable, and as such, it was difficult to figure. Then once the mirror was installed in the telescope, the figure again changed with changes in temperature. The invention of Pyrex glass largely solved these problems. But there was still the difficulty of casting large mirror blanks, as exemplified in the story of the 200-inch Hale telescope.

The Hooker 100-inch reflector at Mount Wilson is an example of the new generation of instruments in the twentieth century. It was completed in 1917, but its primary mirror maintains a tie with the past. The mirror blank was cast by the St. Gobain Glass Works in France.

Throughout its history, this firm had derived much of its revenue from the production of the green-colored bottles used to protect vintage French wines. Not wanting to depart from tradition, the mirror for the 100-inch was cast out of green glass!

Among its accomplishments, in 1920, the 100-inch was used to pioneer the technique of stellar interferometry using coordinated observations from widely separated telescopes to examine the features of stars to unprecedented levels of detail.

Despite the increase in light gathering ability, mirrors still were unable to maintain a perfect image over the entire field. Today, active optics provide the best possible image by slightly changing the figure of the mirror to compensate for atmospheric effects.

An important part of the history of the telescope involves the sites where they were built. Especially with the coming of the large reflectors, it was realized that the location of the telescope plays a critical role in the performance of the instrument. Yerkes was the last major observatory to be constructed near sea level. The Lick Observatory 36" refractor had been installed on Mount Hamilton in California, and this signaled the migration to mountaintops that was to come. Mount Wilson now suffers from the light pollution of Los Angeles, but the quality of the seeing there is still regarded among the best at any of the observatory sites.

The development of large refractors came to an abrupt end with Yerkes. But not all the telescopes of the past have been relegated to serving as museum pieces. Some are still used for important research work where image quality is especially important. In studies of the cosmic distance scale, traditional measurements of the distances to stars are unreliable beyond 100 light years. Trigonometric parallax is the most precise method of measurement, and the rest of the distance scale is built off it. At this scale, angles are very difficult to measure, so the Allegheny Observatory 30-inch Thaw refractor has been fitted with equipment for multichannel astrometric photometry in order to measure parallax to an unprecedented accuracy of 1 milliarcsecond.

The Yerkes 40-inch has done spectroscopic work and photometry, which is the direct measurement of photons to create intensity traces that are used to measure star magnitudes precisely to 0.01 magnitude. The 40-inch has also re-photographed stars that were originally photographed around 1910 to see how much they have moved in the intervening years. By using the same telescope over a long span of years, the image scale remains the same so that the positions of stars can be measured with significantly higher precision.

At Mount Wilson, the Hooker 100-inch reflector has been pulled out of moth-

*(See History on page 4)*

( **SALE** from page 1)

There has been a lot of talk over the past few years as what to do with the building. A growing opinion is that the dome has exceeded it's usefulness and is not worth the effort to save. It is in need of some repairs because of a lack of interest in maintaining it. To my knowledge no one has looked into a realistic cost of what it would take to relocate it. But at this point, I think the board would not be willing to spend any money to move it even if land was available.

So we have a dilemma as to what to do with it. We know that something needs to be done soon. The board is presently looking into a new home for it.

## Astronomy 101

By Kevin Bert



## From The Editor

By Kevin Bert

**H**ello members of the Northern Cross. This months lead article has information on the fate of the NCSF Observatory. I was involved in the construction of this Observatory back in the early 80's and have many fond memories of it. There has been so much energy and time spent on this and other projects over the years and it has taken a back seat when sorting out the club's priorities.

The next article is the second part of the short history of the telescope.

Speaking of telescopes, there have been some developments on the 20 Inch Panarusky telescope. The project has lost momentum for the past few months. See current Clack for details. Jupiter and Saturn continue to be the

We should know in a few months if that will work. If that falls through I would ask each member to start thinking if they would like to have it for themselves. At this point we are simply looking to give it away to anyone who is interested in spending whatever it takes to move it. Club members will get first considerations. Schools and other astronomy groups will be contacted second, and the public in general last. It is hoped that it would remain in the area and put to good use. As a last resort, it would be scrapped and torn down if a specific deadline could not be met.

**T**he November 101 topic will be "SkyTools" by Jeff Setzer. SkyTools is designed to aid observers with observation planning, charting, and logging. SkyTools excels at telling you what you can observe on a given night and how to find it.

The highlighted constellation will be Aquarius.

prime position in the Eastern sky early in the evening. A person leaving work from Carlson Tool's second shift told me that he had seen the best Northern Lights display he had ever seen. Brilliant shades of red green and white dancing overhead and to the north. He woke up his family and watched it for almost an hour. Get into a habit of looking for it on any clear night.

If you have noticed, the calendar section on page 1 is slimming down on public events. There is always a possibility of other dates, but it might be a good time to get a few more members viewing activities in before the snow flies.

## CURRENT CLACK

### WELCOME NEW MEMBER

**Don Miles** from Cedarburg

#### 20 Inch Panarusky Telescope.

Kevin Bert was able to set up and test the primary mirror at Carlson Tool this last month. Several zonal readings were taken and averaged. His assessment is that the mirror has a very good figure. It shows a slight over correction from a theoretical perfection, but it is within the tolerance envelope.

Kevin reported one minor setback. Carlson Tool has been moving in new machines over the last months and has run out of room to store the telescope. It has been a permanent fixture at Carlson for a number of years. They have been telling Kevin that some time soon the scope would have to go, so it was not a total surprise. The good news is that the telescope is being stored in a warehouse just across the street. That would be the old Doerr Electric plant. It can easily be retrieved and worked on when needed. The bad news is that it will cost us about \$20.00 per month to store it.

This might be just what was needed to push the job to completion. The work load at Carlson is presently very low. Kevin says opportunities to machine parts will increase soon.

There is a very good chance that a completed telescope will need a temporary storage site until details on a final site are worked out. I don't think we would want to continue renting space at the old Doerr plant. We will entertain possible sites for storage come spring.



## 1999 OFFICERS

**President - Jeff Setzer**  
1418 Trillium CT  
West Bend, WI 53095  
262/338-8614  
jeffrey.setzer@gxsc.com

**Vice President - Dan Prosser**  
1857 Blackfoot CT  
Grafton, WI 53024  
262/375-9087  
pprosser@execpc.com

**Secretary - Kevin Bert**  
2292 Ridgewood Road  
Grafton, WI 53024  
262/375-2239  
kevin.bert@mixcom.com

**Treasurer - Brad Plaumann**  
4266 N. 88th Street  
Milwaukee, WI 53222  
414/535-0219

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balls to be used for remote imaging and binary star speckle interferometry, a cutting-edge way to measure the magnitudes and colors of individual binary stars. It's finding renewed usefulness in the study of point sources such as individual stars and clusters, and in solar system work where objects are not as severely affected by light pollution.

This article has chronicled the development of lens and mirror-based telescopes as each reigned as the instrument of choice. Of course, space limitations here simply don't permit a thorough coverage of the subject, so many highlights were omitted. There have been a number of design variations on the traditional refractor and reflector. The important point is that telescopes are a technology with great longevity. Many of the good old telescopes that survive -- whatever their design -- can still be useful instruments to this very day.

## SPECTRUM

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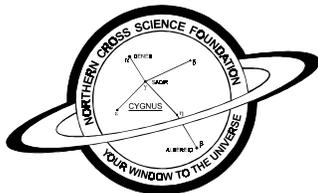
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**Send inquiries to:**  
SPECTRUM  
2292 Ridgewood Road  
Grafton, WI 53024

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