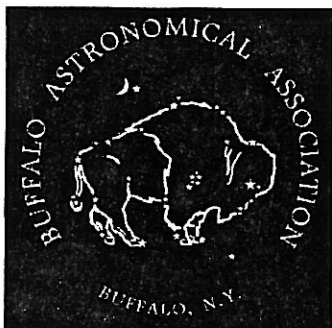


# THE SPECTRUM

Volume 1, Issue 2

November/December 1998



## Inside This Issue

BAA Annals pg 6

Spy @ Tell pg 2

Meetings Notices pg 3

Membership Corner pg 3

Finding M101 pg 4

Astronomy at Lime Lake  
pg 7

Astronomical Happenings  
pg 8

Star light, Burst, Dust pg 8

Minutes BAA Board Meeting  
pg 9

Observatory News pg 6

Observation Report pg 6

Plus Much More

## MEASURING THE FRACTION OF THE SUN'S DISC COVERED BY THE MOON DURING A SOLAR ECLIPSE

By Fred W. Price.

Most amateur astronomers have witnessed a solar eclipse, perhaps more than once, and have probably recorded its progress by drawing or by photography. In addition to these it would be interesting to measure what fraction of the sun's disc is covered at various times during the eclipse at a specific locale.

Eclipse predictions usually state what percentage or fraction of the solar disc will be covered by the moon, usually at mid-eclipse, as seen from a specified location. In all the books on Astronomy I have read, including mathematical treatises, I have never yet found an explanation of how the fraction of the sun's disc covered at any stage of an eclipse at a given location can be calculated from observational data. I therefore decided to tackle the problem myself.

Two obvious data that can be recorded during an eclipse are the apparent diameter of the solar disc and the distance between the "cusps" of the partially eclipsed sun. I reasoned that there must be a mathematical equation relating these and the fraction (F) of the sun's disc obscured by the moon; the more the moon moves onto the sun the wider apart do the cusps become as more of the sun becomes obscured and the greater the value of the ratio  $c/2R$ , where  $c$  is the apparent distance apart of the "cusps" of the eclipsed sun and  $R$  is the sun's apparent radius.

Owing to the ellipticity of the Earth's orbit around the sun and the moon's orbit around the Earth, the distances of the Earth from the sun and the moon from the Earth vary. The result of this is that the apparent angular size of the sun as seen from the Earth varies from  $31'31''$  to  $32'38''$  and the angular size of the moon varies from  $29'20''$  to  $33'30''$ .

To simplify the derivation of the equation I assumed the special case in which the apparent diameters of the sun and moon were the same and calculated F for stages of an eclipse up to totality. The derivation of the equation would take up too much space in the *Spectrum* so I will give just the equation itself:

$$F = \frac{2}{\pi R^2} \left[ \frac{\pi R^2 \alpha}{180} - \frac{c \sqrt{R^2 - \frac{c^2}{4}}}{2} \right]$$

( $\alpha$  is the half angle subtended by  $c$  at the center of the moon.) If the values of  $c/2R$  are plotted on a graph against F at any stage as determined from the equation, the accompanying curve is the result. From it can be read directly how much of the sun is covered by the moon simply by evaluating  $c/2R$  with a pocket calculator and reading from the graph the corresponding fraction of the sun that is obscured. Three methods can be used to measure  $c$  and  $R$  during an eclipse: (1) Directly at the telescope with a filar micrometer, (2) from enlarged photographs of stages of the eclipse and (3) from the image of the eclipsed sun projected onto a screen with a telescope. It doesn't matter what units of measurement are used since it is the ratio  $c/2R$  that is used to evaluate F from the graph. When using a filar micrometer, measurements will be in arbitrary micrometer divisions. If measuring a photograph or the projected image of the eclipse, millimeters can be used. The diameter of the solar disc need only be measured once and will serve as the value of  $2R$  throughout the eclipse.

(Continued on page 5)



### Officers

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# Spy and Tell

by Edith Geiger

Our striking BAA T-shirts are selling at a rapid rate, even to people outside our membership, who are impressed with its eye-catching design.

**Gene Witkowski**, our President, who was the mastermind behind its creation and the BAA banner, went to a garage sale wearing the T-shirt. As he went into the back yard, the gentleman who was there stared at the shirt and said he thought it was very nice and would like to buy one for his friend in Berkeley, California, who was from Buffalo. When Gene inquired as to whom it might be, he was surprised and delighted to find that it would be going to widely known (Dr.) Cliff Stoll, who, by the way, used to assist Ernst Both in the Kellogg Observatory on Public Nights when he was a high school student at Hutch Tech. In October of 1990, he was seen on NOVA in "KGB, the Computer and Me," a dramatization of how he cracked a major spy ring in West Germany. He is also the successful author of the Cookoo's Egg, and Silicon Snake Oil: Second Thoughts on the Information Highway.

On August 7th, **Darwin Christy** went to Sausalito, California, to visit his cousin who, during Darwin's stay, showed him around the whole San Francisco Bay area. On August 12th, at his cousin's home, the chair in which Darwin was sitting started to sway as an earthquake of magnitude 5.4 was felt at 7:11 A.M. in the vicinity and as far as 80 miles south. His cousin, who was still asleep, felt nothing. He informed Darwin that people pay no attention to them unless they have a magnitude over 8.5. While in Sausalito, Darwin took pictures of the full moon through the fog over Oakland, across the Bay, and saw Venus in clear skies every morning. After an enjoyable week he returned home on August 14th.

From September 26th to October 1st, Darwin and his lady friend, Ann MacGill, went to Branson, Missouri, to attend the reunion of the 70th Fighter Squadron from WWII. They went to a number of meetings, and Darwin, who has been their official photographer for four years, took group pictures as well as couples and single members for this special occasion. Twenty-seven of the remaining 143 in the 70th Fighter Squadron were able to be present. Besides the reunion, Darwin and Ann went to see the Bobbie Vinton, Lawrence Welk, and

Shoji Tabuchi Shows.

**Milton Pankiewicz**, now retired from New York Telephone, was a switchman (one who opens and closes a circuit). He maintained the electrical, mechanical, and electronic equipment in the central office.

**Clark Chapman**, well-known astronomer and author, and son of the late BAA member, Dr. Seville Chapman and Mary Chapman, appeared on NOVA September 1st, in "Doomsday Asteroid," along with other notable astronomers. Last May 1st, he testified about asteroid/comet hazards before the House Subcommittee on Space and Aeronautics.

**Carl Milazzo** has another of his photos in Sky & Telescope. This time it is a picture of the Pleiades and Hyades with a foreground of a Lake Ontario lighthouse at Golden Hill State Park bordering Niagara and Orleans counties. (see pg. 198).

**Richard Pason** is a Service Engineer for Elscint Corporation based in Israel, and works on medical imaging equipment (CAT scan) mostly in hospitals in the area. His wife, Patricia, now a full-time Mom, is a retired X-ray technician. Richard and Patricia have a 6 year old daughter and a 7 year old son. Richard is a newcomer to astronomy, and finds it very exciting. He enjoys spending time gazing at the Sun with his Sun filter.

**Bill Smith** had his photographs on display at the 37th Quaker Arts Festival in Orchard Park, September 19-20. There were more than 400 exhibitors at this nationally known event.

**Gene Witkowski**, as of now, is a 30-gallon blood donor through the Buffalo Regional Red Cross Blood Service. Gene always gives of himself to help others.

Happy Holidays!

Edith L. Geiger



## Help Needed for November Meeting!

We're hoping for a big crowd at our November meeting on Choosing and Using a Telescope. We're also hoping for a lot of TELESCOPES at the meeting. This way, interested budding astronomers (and experienced observers looking for "just one more scope") can get a first hand look at the types of telescopes available. If you've got a telescope, pair of binoculars, or other observing aid you'd like to show off, please bring it to the November meeting and be part of the program. If the weather cooperates, we may even have a chance to take a look at Jupiter or Saturn through a variety of scopes and eyepieces. Thanks for your help!!

## Membership Renewals

**If you have not paid your dues as of yet your membership is about to expire!!! There was an increase of the dues to \$ 20 Individual membership, \$ 25 family membership and \$ 15 for seniors and students. Contact Joe Orzechowski for your renewal.**

### MEETINGS CANCELLATION POLICY

If, for any reason, (most likely snow or ice storms), there might be cause for cancellation of the meetings of the B.A.A., tune your radio to either WBEN (930) or WGR (550). Also if Buffalo State College has been closed due to inclement weather, so will the meeting of the B.A.A. be cancelled.

### BEAVER MEADOW TELEPHONE

The telephone at Beaver Meadow, 716-457-3104, is for emergency use only at no cost. Local calls may be placed for a small charge - see the

collection box by the phone. This phone cannot make long distance calls.

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# Monthly General Meetings Notices

Meetings held in the New Science Building Aud. at Buff State

## November 13 1998 — Choosing and Using a Telescope 7:30 PM

Been wondering about those strange lights in the sky? Maybe you'd like to explore the moon, or visit remote galaxies millions of miles away. Whether you're thinking of getting a telescope or you've got one that's been sitting in the closet for years, the BAA invites you to attend this talk given by Larry Carlino and Joe Orzechowski. This hour long presentation is the second part of our 1998/1999 lecture series for the beginner amateur astronomer. Topics in this lecture include: What types and where to buy telescopes, what can you see and how can you find it, and where can you go for help. Weather permitting there will be hands on demonstrations following the talk. The BAA NEEDS YOUR HELP by bringing in your telescope, binoculars, books etc. to display and answer any newcomer questions. If this meeting is anything like the September meeting it will be standing room only. So be there or be square.

## December 11 1998 — BAA Holiday Party 7:30 PM

Our December meeting will, of course feature Edith Geiger's annual candid camera show. This presentation spotlights BAA members who have fallen victim to Edith's quick and sneaky camera finger. The show will be followed by a Christmas wine and cheese party. Anyone who wishes to donate a few cookies for the party is welcome to bring them along. They will be greatly appreciated.

### SPEAKER SCHEDULE FOR 1999

**January '99** Getting Started Without Getting Lost in the Dark - Joe Orzechowski and Jack Mack present this introduction to navigating the night sky. To be presented in the planetarium.  
**February '99** Guest Speaker from the National Weather Service  
**March '99** The Annual Dinner Meeting, speaker and location TBA.  
**April '99** Where Did All the Water Come From? - Doug Love on the origin of the earth's oceans.  
**May '99** Fossil Evidence of Life on Mars - Jack Berkley of SUNY Fredonia examines the evidence that life once existed on Mars.  
**June '99** Annual Business Meeting and Board of Directors Elections. Guest Speaker Bob Reid (University of Toronto) on whether or not the earth is REALLY being pelted by house-sized snowballs.

All speakers and topics are tentative and subject to change. If you know someone who'd like to be a speaker, if you've got a 30-45 minute talk you'd like to give, or if there's something you'd really love to hear a talk about, please see a member of the Speakers Committee (Bob Hughes, Carl Milazzo, Joe Orzechowski, Bob Titran, and Gene Witkowski).

### PROPOSED AMENDMENT TO BAA BYLAWS TO BE VOTED ON AT THE NOVEMBER MEETING.

**PURPOSE:** The purpose of this change is to include the Editor of THE SPECTRUM as a member of the Board of Directors. Change as follows in Article 2, Section 1, Paragraph A: Delete the first word "Three", and substitute "Four". Add to the end of the paragraph: "The fourth shall be the Editor of the association's newsletter, THE SPECTRUM, if currently published. (See Article 2, Section 8 for the procedure for selecting the editor.)"  
**RATIONALE:** Article 2, Section 1 tells how to select the editor of THE SPECTRUM, but never tells what THE SPECTRUM is. Also a vote on the new logo will be in order. A 2/3 vote of the membership present is needed to pass these amendments.

### SPECTRUM HELP NEEDED!!!!

Help is really needed in the circulation aspect of this newsletter. I can handle the design /layout of the Spectrum but folding, stapling, stamping and sending 140 copies on top of the layout is very demanding of my time. Any one interested please contact your editor.

## MEMBERSHIP CORNER

by Joe Orzechowski

The membership rolls of the BAA have been growing at an astronomical rate (please pardon the pun) in the last couple of months. During the summer months of June, July and August we gained 8 new members while during the same time period last year we only had two people join. And this trend has continued into the new membership year which has started with a big bang (oops, there I go again). A total of 12 new membership applications were accepted and processed during September and October. This compares to 6 new members for the same two months last year. This means that BAA membership currently stands at 140. Much of this gain in membership must be attributed to the great programs put on at the Beaver Meadow Observatory by Bill Aquino and Neil Dennis and to the well placed and well timed press releases distributed by Bob Titran. Nice job guys.

Since we've had so many new members join in the past two months and since I plan on publishing the Membership Directory in December this year, I am only going to list the names of our newest members at this time. Lets give a warm BAA welcome to: **Gene Belstrax, Frank & Tricia Fendi, Gary & Mary Halter, Linda Hutton, Robert Miller, Stephen Oross, Jim Rycyna, Ken & Karen Schlum, Eric & Sally Thom, Hector Velasco, Frederick Wood, and Dan & Alison Wrazen.** I'd like to encourage our newest members as well as any member who is just starting out in the hobby of astronomy to join us at our November 13th meeting when the topic will be "Choosing and Using a Telescope".

September was the start of the new membership year which means that

it's time once again to renew your membership in the BAA. Dues have been increased for the coming year. The annual fee is now \$20 for an individual membership and \$25 for a family membership. Senior members (60 and older) and full-time students are eligible for a discounted rate of \$15 per year. Dues may be paid at one of the upcoming general meetings or dues may be mailed to me at 125 Roycroft Blvd, Amherst NY 14226.

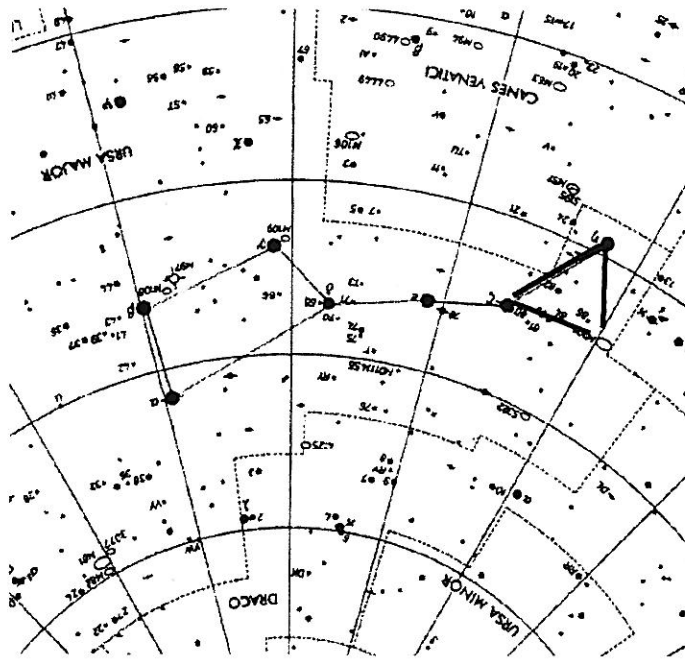
Finally, I would like to take this opportunity to announce my desire to resign as Membership Chairperson no later than the end of this membership year. My obligations at work which include frequent trips out of town are having an impact on my ability to adequately perform my duties as Membership Chairperson. One example of this was my failure to notify the Spectrum editor of this year's increase in dues. As a result, the old rates were published in the last issue of the Spectrum and this led to some confusion for renewing members. The only requirements for the position are a computer to maintain the membership database and a printer to generate mailing labels and the Membership Directory. An old DOS-based database program which I inherited may be used or I can work with the new Membership Chairperson to convert the records to a new database format (e.g., Access or FoxPro). If anyone is interested please give me a call at work at 632-7091.



## Finding Messier 101 in 10 seconds

If you can't find M101 in about 10 seconds then perhaps your hunting method need refining. Lines, triangles and rectangles are the basic 'building blocks' for finding many objects.

Look at this reproduction of the region of the Big Dipper. I've drawn in lines



from each of the two end stars of the Big Dipper to M101 and between the two stars themselves. Notice how an almost perfect equilateral triangle is formed. The eye is very good at making uniform triangles from 2 visible objects (the bright stars) and an invisible one that is your quarry (the invisible M101).

- Using a Telrad or similar 'zero-power' finderscope makes a snap

out of creating triangles, rectangles or going a fraction of the distance between 2 points of a straight line.

- Be sure your Telrad is lined up with your scope!
- It may help to make a clear 'bulls-eye' diagram of the Telrad view to use on your map to measure off some distances so you get used to how large 2, 4, 6, ... degrees is in your Telrad view

An optical finderscope is at a severe disadvantage here as it does not have the field-of-view to enclose the guidepost stars. Naturally you should have your widest angle eyepiece in the telescope to increase your chances of locating objects using any method. My 40mm MegaVista eyepiece yields a 1.8 degree field-of-view at 36x in my 10" f/5.6 Dobsonian. If you don't have a wide field eyepiece, make it your next astronomical purchase – it will be on your scope a lot!

Here are some samples to try. Find them on a map first so you can tell what I mean by "a bit to the right of". The methods listed are the ones I use, better ones may exist so send them in to the SPECTRUM. Experiment and create ways of your own, then share them with other members. Let's make "I can never find ..." a thing of the past.

When devising whether to use lines, triangles or rectangles (rare), it is probably best to do this indoors on a cloudy night, at ease, with your favorite star atlas or computer planetarium program. For planetarium programs I adjust the dimmest stars to about 2 magnitudes brighter than those visible from where you view. The dim stars are not well seen through the Telrad anyway, especially so when it has a layer of dew on it. There are enough stars down to mag 3 or 3.5 to act as guide stars.

Using the simple methods of lines, triangles and rectangles allows many favorite objects to be viewed in short order thus giving you time for some new ones. I often view the top 20 Messiers available on a particular evening in just about as many minutes. Practicing often on your favorite objects makes it not only easy to find them whenever they are up but allows you to "show off" to visitors or the public just "how easy" finding objects can be.

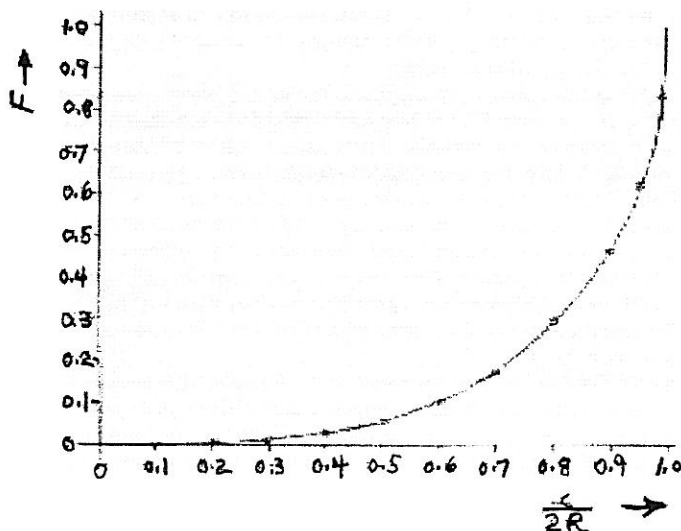
- Bill Smith



OBJECT	CONSTELLATION	METHOD (Star magnitudes are listed like 'm3.4')
M106 - galaxy	Ursa Major	Touch over halfway from m2.5 Phecda to m4.3 Beta Canes Venatici
M81&82 - gal	Ursa Major	Extend line across Big Dipper Bowl from m 2.5 Phecda to m2.0 Dubhe same distance and move a bit toward the Little Dipper
M94 - galaxy	Canes Venatici	Makes a flat isoseles triangle with m2.9 Cor Coroli and m4.3 Beta Canes Venatici; move a bit toward Cor Coroli
M33 - galaxy	Triangulum	Extend a line from M31 (Andromeda galaxy) thru m2.4 Beta Andromeda (Mirach) and move a touch toward the Double cluster in Perseus.
M92 - Globular	Hercules	On line from m3.2 Delta thru m3.4 Pi Hercules, same distance from Pi as m3.6 Eta Herc is from Pi (the top of Hercules's chest).
M27 - Pl	Vulpecula	Note the positions of m2.3 Gamma Cygnus and m2.6 Epsilon Cygnus relative to the m1.3 Deneb-m3.2 Albireo line (a bit off of perpendicular). M27 is separated from Albireo the same distance as Gamma-Epsilon but off perpendicular in the opposite direction (makes a rectangle with one long side a bit short). Also note that M27 is 1/3rd further out on the line from the m0.9 Altair to m3.7 Gamma Sagitta line as an alternate method.
NGC 457 - OC	Cassiopeia	Makes a near right triangle with m2.8 Gamma and m2.8 Delta Cass. Move off the right angle a bit toward Gamma.
NGC7331 - gal	Pegasus	Extend a line from m3.7 Mu Pegasus thru m3.1 Eta Peg another 80%. Also note galaxy's position relative to Beta and Eta. A snap to find!
NGC 7009 - Pl	Aquarius	The Saturn nebula is found just below and a bit more than halfway from m3.3 Beta Capricorn to m3.1 Beta Aquarius
M56 - Globular	Lyra	A bit more (55%) of the way from m3.3 Gamma Lyra to m3.2 Albireo.
NGC7293	Aquarius	This makes an almost right triangle with m3.5 Delta Aquarius and m1.3 Fomalhaut, the short leg is a bit more than half the distance from Delta to Fomalhaut.

(eclipse continued from page 1)

Photographic measurement is the most convenient as it can be done at any time after the eclipse. Don't forget to record the exact clock time of each exposure! Measurements should be made from fairly big enlargements to ensure accuracy. An equatorially mounted telescope with an accurate drive is essential for precision when making measurements with the filar micrometer or from the projected solar image. In the latter case, a projected solar image 10 cm in diameter would be a convenient size. Measurements made on this to the nearest millimeter would be accurate enough. At any stage of a solar eclipse it is better to make a measurement of the distance between the eclipsed sun's cusps and then note the time immediately rather than note the time and then make a measurement. It is rather rare for the solar and lunar discs to be of the same apparent size during an eclipse. In a total eclipse the total phase would be very short-lived! Usually the moon's disc will be somewhat larger than the sun's. In this case determination of  $F$  during the partial phases will require a modification of the basic equation. So will the situation when the moon's disc is apparently smaller than the sun's which would result in a partial or annular eclipse. A moment's thought will show that in these situations, unlike the first, the apparent distance ( $c$ ) between the sun's cusps during the progress of a total or annular eclipse will increase up to a maximum and decrease again as totality or annularity are approached! I am presently working on equations for these.



Fred Prices' graph showing the fraction of the sun's disc covered during an eclipse as a function of the ratio of the distance between the eclipsed sun's "cusps" and the solar diameter.

$R$  = solar radius

$c$  = distance between sun's cusps

$F$  = fraction of sun's disc covered

Graph portrays the special case where the apparent solar and lunar diameters are equal.

## AMATEUR TELESCOPE MAKING OF THE 1990's

Often you will hear from some local amateur astronomers, that amateur telescope making these days is dead, but they are dead wrong. If they were to attend any astronomy convention like Stellafane, Star-Fest, Astro-fest, ect, they would see plenty of new home made scopes. Some are of copied-designs and others have newly improved designs.

Even our astronomy club has several experienced telescope builders. Darwin Christy has made several scopes : optically ,mechanically, and electrically, with the largest being 12 inches in diameter. Larry Carlino over the years has built many scopes ,his largest is a 28 inch dobsonian. Tristan Dilapo and Carl Milazzo have jointly built and own a 26 inch dobsonian. Both have built several other scopes 17 1/2 inches and smaller. Bill Smith and Tom Bemus have jointly built a 30, 20 and 17 1/2 inch dobsonians along with several smaller scopes. Gean Witkowski has modified his 14 inch German equatorial scope into an 18 incher .Ed Czapla has made a modern 17 1/2 inch Dobsonian. Dan Marcus and Bill Smith have jointly made a 12 inch German equatorial and dobsonian. Gary Baldwin has fabricated a 12 inch German equatorial, and a 8 foot domed observatory. Edith Geiger and Darwin Christy also have home made dome observatories, and Larry Carlino has a homemade roll off roof observatory.

by Carl Milazzo

(ED NOTE: While on the subject of telescope making , a group at the observatory ( Tim Leary , Neil Dennis and Bill Aquino for the most part) made a 6 inch dob which may be on display at the November meeting)

## THE LUNAR CRATER MYSTERY (cont.)

The article in the Sep./Oct. Spectrum by Fred Price on the Lunar Crater Plato reminded of a voice from the past - a presentation by David Rittenhouse (1732-96) of Philadelphia. I have given a few excerpts:

Explanation of a Deception

by D. Rittenhouse

Read March 3, 1780, before the American Philosophical Society :

Some experiments were long ago communicated to the Royal Society of London, shewing, that through the double microscope, the surfaces of bodies sometimes appear to be reversed that is, those parts which are elevated seem depressed, and the contrary. But the cause of this appearance, for any thing I know, remains still to be explained. . . .

It has often been matter of surprize to me, when viewing the moon through a good telescope, in company with persons not accustomed to such observations, that whilst the cavities and eminences of the moon's surface appeared to me marked out with the utmost certainty by their light and shades, my companions generally conceived it to be a plain surface of various degrees of brightness. . . .

[he describes the optical illusion effect and then describes experimenting, including with different light sources on the bricks of his fireplace, and with refracting and reflecting telescopes] . . . The truth seems to be, that the mind chuses the least difficulty; and though in consequence of the judgement it has formed concerning the direction of the light, it will submit to a small imposition [to change the image orientation].

by Steve Kramer

### SPECTRUM DEADLINE

The deadline for the Jan/ Feb issue is

**December 10 NO EXCEPTIONS**

Send all submissions to Tim McIntyre

157 Dartwood Dr. Cheektowaga, NY 14227

E-Mail TMcint9320@aol.com Phone: 668-8322

Preferred format is typed or PC readable WordPerfect for DOS 5.1 or earlier, MS Word for DOS Scanning available

## BAA ANNALS by Rowland Rupp

**5 YEARS AGO** - In November 1993 a number of BAA members were to give short talks on the moon in preparation for the coming lunar eclipse. Edith Geiger's annual "Candid Camera," was the feature attraction (along with the Christmas party) at the December meeting. The SPECTRUM carried an article by President Bill Smith, in which he briefly outlined the history of the purchase of the 20-inch Obsession telescope and the construction of the addition to the observatory, which was then nearing completion. He thanked those whose efforts made the final result a reality; some 23 members were cited. Leslie Martin's article was on the early history of the nebular theory that explained the formation of the solar system. Another article, apparently extracted from an unidentified club's journal, was a concise summary of telescope properties that might be useful to fledgling astronomers. Its author was Nils Turner. BAA Secretary, Luann Szucs, was the subject of Edith Geiger's membership profile.

**10 YEARS AGO** - Ten years ago we heard about "Super Computer - How They Make Astronomical Discoveries" from Dr. Philip Kronberg, Professor of Physics and Astronomy at the University of Toronto. In December, Darwin Christy revealed to us some of the sources he uses to write his long-running series of "Ancient Constellations" for the SPECTRUM. Ernst Both showed "Solar Activity", slides taken by BAA member Walter Semerau at his highly renowned solar observatory. Edith topped off the meeting with her annual slide show. Dan Marcus had just volunteered to be the new observatory Director, and announced in the SPECTRUM his plans for revitalizing the facility. The Magellanic Clouds were the subject of an article by SPECTRUM Editor, Darwin Christy. Tristan DiLapo wrote a review of David Eicher's book, "The Universe in Your Backyard", concluding it is "geared toward the novice or intermediate amateur, but has plenty of interest for the advanced observer". Edith's profile was on Doug Smith. According to her Spy and Tell, Fred Price's book "The Moon Observer's Handbook" was about to be released. She also had a note about our late member Al Ricciuti and his famous stone house. The sole observation report was by Carl Milazzo.

**15 YEARS AGO** - In November 1983, Dr. William Harris of McMaster University at Hamilton, Ontario spoke on "Globular Cluster Systems in Galaxies". For December, Edith's candid camera show was preceded by a report on the annual meeting at Stellafane by Beverly Botto, Darwin Christy and Carl Milazzo. A notice from President Rowland Rupp weighed the possibility of dropping our membership in the Astronomical League, an action we eventually took. The SPECTRUM contained an article on "Looking Back" by our old friend Anonymous. It covered the distance we can see in space and time using various instruments. Steve Kramer was the subject of Edith Geiger's profile. Member Michael Idem wrote on improving suburban deep-sky observing. He also contributed an observation report, as did Darwin Christy and Carl Milazzo.

**25 YEARS AGO** - We met at the Buffalo museum of Science, our former home, in November 1973 to hear Larry Hazel and Vern Siegel speak on the solar eclipse they viewed in Africa on June 30th. For December, Ed and Olga Lindberg were scheduled to speak, but their topic was not given. Edith entertained us in her traditional way in December. The Observing and Study Section was scheduled to meet at the old Newstead Observatory. Ernst Both submitted a detailed summary of the anticipated position and probable brightness of the eagerly awaited apparition of "Comet 1973f. Kohoutek". John Riggs gave hints on deep-sky observing, Warren Steinberg reported on the Instrument Section, Fred West wrote on the October meeting of the AAVSO.

**35 YEARS AGO** - UFOs was the topic at our November 1963 meeting. Our speaker was Norman Weiss "a serious student of these phenomena". Strange, this notion of spooky visitations still persists and remains profitable to those exploiting it. Ernst Both showed a movie at the December meeting highlighting his solar expedition to northern Canada in July. Also, Dr. E.P. Tschermock spoke on an "electronic device", invented by him and his father, to improve the resolving power of telescopes. Not much else appeared in the SPECTRUM - just some "Telescope Tips"



## Observatory News by Bill Aquino

### Open House Canceled

The Beaver Meadow Open House scheduled for the afternoons of November 14 and 15 has been canceled by the Nature Center, likewise, the Beaver Meadow Observatory Open House is also canceled.

### Roof Repairs

Extensive re-construction repairs to the sliding roof system at the observatory have been taking place during the month of September. Most of the heavy and dirty work has been completed and the finish-up, final adjustments, and clean-up will be done over the next month or two. **SPECIAL THANKS** need to be extended to the following members who put in some long tough hours; Neil Dennis, Jeff Gardner, Tim Leary, Frank Chalupka, Gene Witkowski, Dan Marcus, Anthony Davoli, Bill Aquino and Rick Pason.

### Thank You for your Generosity

The following members have recently made donations to the observatory. Your generosity is greatly appreciated. **THANK YOU!** Dan Marcus, Gene Witkowski, Jeff Gardner, and Neil Dennis have all donated building construction materials for the roof repairs.

### Public Night At The Observatory Ends For The Season

Oct 17 th marked the last Public Night for the season. Don't let that stop you from coming out to brave the cold on a nice clear winter night. The winter Milky Way offers many celestial delights to observe. So if your not "checked out" on observatory procedures contact Bill Aquino or Neil Dennis to get "checked out".

## OBSERVATION REPORT

**Date of Observation:** 08/27/98

**Time of Observation:** 10:30 PM (EST)

**Location:** Beaver Meadow Observatory

**Observing Conditions:** Good to Very Good

**Instrument:** 20" Dobsonian w/22 mm Tele-Vue Eyepiece, Cookbook CCD Camera on a 12" Newtonian.

**Observed:** Supernova 1998DH

### Comments:

The supernova 1998DH was discovered on 20 July 1998 at the Lick Observatory by a supernova search team from the University of California at Berkeley. This is a type 1A supernova and is located in the spiral galaxy NGC-7541 (mag 11.7 / class SBbc) in the constellation Pisces. Type 1A supernova occur when a white dwarf increases its mass by siphoning matter from a nearby companion star. When the mass of the white dwarf increases to more than 1.4 times the mass of our Sun (known as the Chandrasekhar limit) gravity will overcome quantum mechanics and the dwarf explodes violently. These explosions are the brightest in the cosmos and can even at times outshine the entire galaxy where they occur.

continued on next page

curved. The bell shaped light curve (an increase in brightness then a corresponding decrease) which is produced by the explosion lasts between one and two months. The light curves produced by type 1A supernova are very consistent and can be used to accurately measure the distance to the galaxy. This measurement technique is discussed in detail in two recent articles; the September 98 issue of Sky & Telescope magazine on page 38 and the November 98 issue of Astronomy magazine on page 50.

The image of supernova 1998DH shown on the right was taken with the clubs CCD camera on the 12 inch Newtonian long after the supernova reached its peak brightness of 14.0 on August 9th. Visual observations with the 20 inch Dobsonian (at the same time the image was taken) showed the supernova to be barely visible, in fact, averted vision was required in order to see the supernova at all. The galaxy was only about 29 degrees above the south-east horizon at the time of our observations and the moon was beginning to set. We estimate the magnitude of the supernova to be nearly 15.0 at the time this image was taken. Our estimate is by comparison to the known brightness of several stars which appear in the image near the galaxy. The small companion galaxy located above and to the right of NGC-7541 is NGC-7537. — Frank Chalupka, Bill Aquino, Dan Marcus —



Supernova 1998DH located in galaxy NGC-7541 (lower one) is the bright star like object located in the left spiral arms of the galaxy.

### BAA PRESENTS ITSELF WITH A TOUCH OF CLASS



Nice shot folks. The BAA had a nice turnout attend Starfest this past August and represented the club with some pretty classy T-shirts and a top notch banner. Many thanks are in order to Gene Witkowski for doing all the work coming up with the T-shirts and banner. They look great!! Although I heard the weather didn't cooperate to well with night time astronomy sessions, the seminars and occasional glimpses of the sun through Bob Titran's H-alpha equipped scope were superb.

Pictured clockwise starting from back row left: Tom Bemus, Bill Aquino, Kat Bemus, Rick Pason, Dennis Hohman, Bev Orzechowski, Carl Millazo, Janice Gardner, Jeff Gardner, Carol Lorenc, Joe Orzechowski, Bud Abate, Ella Abate, Bill Smith, Anthony Davoli, Bob Chapman, Gene Witkowski, Dan Marcus.

Camera Man Bob Titran

### ASTRONOMY AT LIME LAKE by Rowland Rupp

Editor's Note: This article by Rowland Rupp is in conjunction with Fred Price's article on page 1. Here Rowland discusses a different technique of measuring the portion of the sun's disc covered by the moon during a solar eclipse.

It may be said star parties at Lime Lake lack for astronomical intensity. That may apply to night-time observing, but the one star seen this year prompted a discussion between Fred Price and me, and eventually, Steve Kramer. The star was the sun; the discussion was how to determine the portion of the sun's disc that is covered by the moon during a solar eclipse. Fred opted for measuring the chord between the cusps compared to the sun's radius, while I suggested measuring the portion of the sun's diameter not occulted by the moon compared to the sun's diameter. Both measurements could be made from a photograph or, using a filar micrometer, at the eyepiece of a telescope.

In order to simplify the calculations we agreed to assume the sun and the moon have the same diameter which, while a reasonable approximation, is obviously a special case. Steve, on the other hand, observed that this material must be available in a handbook somewhere and vowed to track it down. In the end, all of the solutions yielded the same results.

The approach I took to determine the portion of the sun's area that remains visible during an eclipse uses the diameter of the sun ( $D$ ) and the portion of the sun's diameter that remains visible ( $X$ ) as shown in Figure 2. I like that approach because during a total eclipse the change in  $X$  is directly proportional to the passage of time, since the moon moves across the sun's disc at a uniform rate. One can then calculate the area of the sun that is visible.

continued on page 9

### BEAVER MEADOW OBSERVATORY

The observatory is open to "checked out" members any time. Call Bill Aquino (731-9366) or Neil Dennis (322-7596) to get checked out. Public nights are held on the 1st and 3rd Saturday nights April through October. There is "members only" viewing after every public night. Help is always needed and appreciated for our public events. You don't need a lot of experience to help out. Stop by and be an "observer" and see just how easy it is. The "vets" will show you how.

# Astronomical Happenings—TIME WELL SPENT IN ASTRONOMY

**November** - Leonid meteor shower may possibly become a meteor storm. don't miss this one.

Date	Time	Elevation	Direction	Event Description
3	2:00 AM	38deg	SW	Saturn 1.7deg north of the Moon
5	9:00 PM	24deg	E	Moon passes 0.6 deg north of the bright star Aldebaran
9	5:00 PM	7deg	SW	Mercury passes 1.9deg north of bright star Antares
13	6:30 AM	46deg	SE	Moon passes 0.5deg north of Mars
17				Leonids meteor shower - new moon - excellent
20	4:50 PM	8deg	SW	Moon passes 7deg north of Mercury
27	5:00 PM	32deg	SE	Jupiter is 0.6deg north of the Moon
30	8:00 PM	49deg	SE	Saturn is 1.8deg north of the Moon

**December** - A great month for viewing Saturn. Have a happy holiday season.

Date	Time	Elevation	Direction	Event Description
3	8:00 PM	30deg	E	Moon passes near the bright star Aldebaran
9	7:00 AM	52deg	SW	Moon passes 0.01deg south of the bright star Regulus
12	7:00 AM	45deg	S	Mars passes 1.8deg south of the Moon
13				Geminid meteor shower - wanning crescent moon - good
16	7:30 AM	18deg	SE	Moon passes 3deg north of Mercury
21	8:58 PM			Winter Solstice
25	12 AM	10deg	N	Red sleigh, jolly man, 8 reindeer, moving fast
25	5:00 PM	42deg	S	Jupiter is 1.2deg north of the Moon
27	5:00 PM	40deg	SE	Saturn passes 2deg north of the Moon
30	5:00 PM	20deg	E	Moon passes 0.6deg north of bright star Aldebaran

## WINTER OBSERVING

Don't let the cold nights of winter discourage you from doing some observing on those RARE clear winter nights, after all you can dress heavily and stay warm.

The winter Milky Way, although not as dense as the summer one contains some of the best deep sky treats to point your telescope at. The Auriga / Gemini area of the sky contains some of the richest open star clusters and my favorite part of the winter sky to just point your telescope and just wander around. Point your scope at M35 and M37. These are just 2 dense open clusters to start with. Who can forget about the great Orion Nebula? If there is nothing to convince you from braving the winter cold, this deep sky treat may just change your mind. So bundle up and point that scope. I know I'll be one of those "fools."

Tim McIntyre

## Star Light ... Burst ... & Dust

by Halina Biernacki

Long ago and far away the Earth's star was once worshipped as a god, and still is a source of enlightenment even today.

Ancient humans have celebrated the Sun in thoughts and actions. Many preliterate societies worshipped the solar disk as the beneficent provider of light and life. The fiery star was called Ra by the Egyptians, Helios or Apollo by the Greeks and Sol by the Romans. To the Mexican Aztecs the Sun god was Huitzilopochtli, whom they nourished with human sacrifices. In an attempt to comprehend its awesome power they designed architectural structures to better understand, measure and venerate their Sun gods. Aztecs edifices served as calendars, astronomical observatories, and sacrificial temples. Egypt's great pyramids at Giza housed dead kings, with their sides aligned with the rising Sun at vernal equinox. The Stonehenge circle in England was constructed so the Sun would rise over one of the great stones at the time of summer solstice. It's also thought this site was used for ritual ceremonies and astronomical study.

Before the Egyptians, Greeks and Romans there were more ancient civilizations. Their beliefs were rooted in the celebration of the natural cycles governed by the movements of the Earth in relation to the Sun and phases of the Moon. Central to this belief were fertility rites. These were ceremonies of a magic religious nature performed to ensure propagation of vegetable, animal and human life. From earliest times humans performed rites in an attempt to gain control of their environment.

In most preliterate societies it was thought the source of power came from heaven, notably the Sun. Kings and queens served as terrestrial mediums. Priests and priestesses administered their temples. The main job was to stave off disease and famine. It was thought that because women housed the ability to produce life, this gift came from the ultimate source ... the Sun. Some societies venerated the Earth.

Canaanite mythology had its life force vested in the Sun Goddess Spisi. This was a group referred in ancient times as Western Semites which included Phoenicians, Ugarites and Hebrews. The oldest example of an Indo-European kingdom was the Hittite culture which was an amalgam of several cultural elements, a representative sampling of the cosmopolitan perspective of the ancient Near East. Their official state cult was dominated by the Sun Goddess Arinna, who was the protectress of the royal

dynasty. Even today in modern Japan the head of their state religion, Shinto, is the Sun Goddess Amaterasu.

So many things have occurred and changed since the first skywatchers. Rituals that attempted to embrace astronomical movements have vanished, only fragments remain, one such is Christmas. Present day festivities associated with Christmas have their origins only as recent as the 4th century AD. The date of December 25th was selected to counter the rituals affiliated with winter solstice of December 21. The traditional pine tree we decorate is actually a fertility rite which took place at the onset of spring to ensure births, lush crops, and a bountiful harvest. They placed pines in the temple precinct and decorated them with live animals and birds and further with gold and silver. They walked around these pines in ceremonial procession holding their individual household deities. Then suddenly lit the pines with a torch for a life force offering. This custom has been recorded to have existed and practiced in Syria in the temple at Hieropolis presumably for the Goddess Niobe in honor of her dead lover Attis. In other rituals Attis is symbolically regenerated as new plant life emerges from Earth.

The rotational cycles of the Earth's path around the Sun and the Moon phases have triumphed over famine, disease, war, political forces and many belief systems. It doesn't hurt to reflect, nor is it unscientific to rediscover the origins of our thinking process. It's an opportunity to integrate past and present time.

For eons humans have burlesqued in ritual ceremonies the natural process of the universe ... birth, life and death. This happens on a molecular level, and in a giant star's doom, as in supernova. Stars more massive than the Sun end their lives in a spectacular fashion. Most of the eruptions go unnoticed from Earth, concealed by the dust and gas between the stars in the arms of the Milky Way. The detonation produces a fireball a million times hotter than the surface of the Sun. Not only are such cosmic infernos spectacular, but the processes associated with them are believed to be a critically important factor in the birth of galaxies and in the creation of the elements necessary for life.

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All stars do not become supernovas. In fact most do not. Only those above six solar masses have the potential to go out in a blaze of glory. In other words, the bigger the star the bigger the burst. Supernova shock waves are thought to be a primary initiator of stellar formation. Moreover, the ashes of a dead star — those elements cooked up before and during the eruption — enrich the nebulas, making the element ratios in the new generation of stars different from the old. All the metals on Earth were forged in the fires of massive stars. Elements heavier than iron — lead, gold, uranium — were created in the fire storms of supernovas. Without supernovas elements heavier than carbon would be exceedingly rare and planets like Earth could not exist. In a universe without supernovas it might be impossible for life to develop. Thank god — OOPS — the goddess our Sun is alive, however our stewardship of planet Earth needs rethinking. May this holiday season give you a sense of enlightenment from past rituals and present possibilities and bring peace, love and joy into your heart. ~

### BRIEF MINUTES OF BAA BOARD MEETING - SEP 8, 1998

ATTENDANCE — Present: Gene Witowski (P), Bob Hughes (VP), Steve Kramer (Sec), Bev Orzechowski (Tres), Jack Mack, Joe Orzechowski, Bob Titran, Rowland Rupp, Bill Aquino; Tim McIntyre (as member). Not Present: Bill Smith, Neil Dennis

CLUB LOGO: GW proposes a new club logo of his design of a black background with a stellar pattern of a buffalo with the club name and "Buffalo, N. Y." surrounding. This would replace the current (apparently unofficial) logo of 35 years of the observatory dome and telescope. (disc. about the issue of changing, and the colors and design) **MOTION:** To accept Gene's new logo (BH, 2d BT) Y: 2, N: 7 **MOTION:** To recommend Gene's logo to the club membership for consideration, to be voted on at Nov. meeting (JM, 2d ) Y: 6, N: 1, Ab: 2

CLUB BANNER: [discussed at the last board meeting, and unofficially approved pending further discussion] GW arranged and paid for the banner, plus 46 T-shirts - \$565 total (his own money), incl. \$250 for the banner. Most of the T-shirts have been sold at profit, thus paying for the venture. GW reports the T-shirts were well received at the summer Ontario Star Fest. GW offered the banner and the right to fit copyright to the logo to the club gratis. This was duly accepted.

BAA T-SHIRTS: GW arranged and paid for an additional 77 T-shirts (his own money), which he offered to sell to the club at cost (+/- \$5, depending on size) and sold for \$15. The sale of 27 would pay for the 77. **MOTION:** For the club to buy the T-shirts (RR, 2d BO) Y: 2, N: 5, Ab: 2 (discussion of procedure, club involvement, monies) **MOTION:** For the club to buy the T-shirts, GW will handle sales and monies for the club (BH, 2d JM) Y: 7, N: 0, Ab: 2 GW then was paid for the T-shirts - \$394.75

BOARD POSITION FOR SPECTRUM EDITOR: GW proposed that a board position for the Spectrum editor be pursued. The editor puts a lot of work into the Spectrum and is involved in the activity of the club. (discussion of procedure — it will be necessary to review the entire By-Laws & Amendmets: RR, BO, BW, BA) **MOTION:** To create a board position for the editor and present the motion to the general membership for vote: (BH, 2d JM) Y: 9 N: 0 Concerning the By-Laws, RR posed the idea of annually re-electing the Spectrum editor and Observatory director(s).

BAA DIRECTORY: GW suggested the directory be issued earlier in the year, perhaps in December, for sooner use of members.

Treasurer: STATUS: (Handouts: Profit and Loss Statement & Balance Sheet) Projected surplus was \$518, however the actual was \$1183.72. Next year the Spectrum costs will double, making that projected surplus about \$600. Part of surplus included a \$300 refund on the annual dinner because of noise. Buffalo Foundation Grant application deadline is Oct. 30. Detail of equipment and activities is necessary.

DISCRETIONARY FUNDS: (discussion of flexibility of President and of Observatory Director to have an amount of funds to spend at their own discretion) **MOTION:** That the President and the Observatory Director each have a one-time discretionary fund of \$200 (BO, 2d BT) Y: 8, N: 1

Observatory: Work on Observatory: - (BA:) Over Labor Day (last) week-end work was done on the observatory by BA, ND, GW, Jeff Gardner, Frank Chalupka, Tim Leary. The roof was removed to a specially constructed scaffolding. The north side had bad rot from roof leakage, which was repaired. Costs were \$150 for lumber and \$10 for hardware, purchased by J Gardner. The northwest corner also has an undetermined amount of repair necessary, to be done next. Because of repairs current, the observatory is not safe for the public and will not be open next week-end. **MOTION:** To reimburse for repair expenses. (BA, 2d BH) Y: 9

CCD Classes: Presently use a flip mirror on loan from Dan Marcus; need one for observatory permanently (\$75), which is in the grant proposal. Audubon building use: BT raised issue of bathroom use and BAA liability of unaccompanied guests.

### ASTRONOMY AT LIME LAKE CONT.

Find the angle (A), as shown in Figure 2. After a bit of algebra and geometry it turns out that:  $A = \cos^{-1}(X/D)$ , where the angle is in radians (there are  $2\pi$  radians in a full circle) This angle can be used to find the sector (S) of the sun's disc denoted by OEF in Figure 2 which is:  $S = A \cdot R^2/2$ , where R is the radius. The area of triangle OEG, after some manipulation, is  $(R \cdot X/4) \cdot \sin(A)$ . Subtracting it from S leaves the area EFG, which is one fourth of the portion of the sun's disc that is occulted by the moon, assuming the sun and moon have the same diameter. Then, the fraction of the sun's disc visible (N) is:  $N = 1 - 2 \cdot (A - (X/D) \cdot \sin(A)) / \pi$  (Eq. 1)

Fred sent me his solution, which appears quite different from mine because he uses the distance between the sun's cusps instead of X. Nonetheless, when I calculated the distance between the cusps that corresponds to any selected value of X that I used, his results were the same as mine. Steve's solution came from the Explanatory Supplement to the Astronomical Ephemeris. It is complicated because it allows for different diameters for the sun and the moon. After making the two diameters the same and

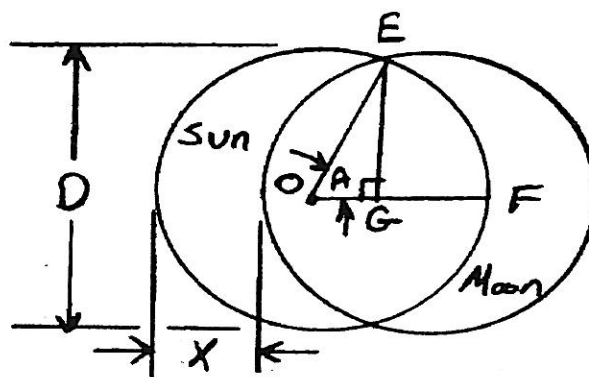


Figure 2

juggling the equations to correspond to the same variables I used, Steve's equation becomes:  $N = 1 - (2 \cdot A - \sin(2 \cdot A)) / \pi$ . Since  $\sin(2 \cdot A) = 2 \cdot (\sin(A) \cdot \cos(A))$ , and  $\cos(A)$  was shown earlier to be  $X/D$ , one finally gets the same expression as Eq. 1. For reference; rounded off results are on the back page.

Rowland's Eclipse Results (Rounded Off) for Reference:

D	C	A	N
1	1	0	1
1	.9	.45	.96
1	.8	.64	.90
1	.7	.80	.81
1	.6	.93	.72
1	.5	1.05	.61
1	.4	1.16	.50
1	.3	1.27	.38
1	.2	1.37	.25
1	.1	1.47	.13
1	0	1.57	0



**Happy Holidays To All !!**

**CLUB T- SHIRTS/SWEATSHIRTS FOR SALE !!!**

**That's Right, you could be the proud owner of one of these T-shirts for \$ 15.00 . These 50/50 cotton blend shirts are black and contain the same logo that's on the front page of the Spectrum. The club also has sweatshirts with embroidered logo available in black or navy blue. The sweatshirts require a \$ 5.00 deposit and cost \$ 30.00 each. Help support and promote the Club with a touch of class.**

**Contact Gene Witkowski for more info.**

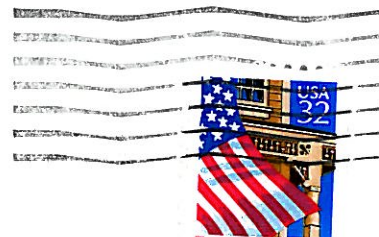
**FOR SALE: CELESTRON REDUCER/CORRECTOR**

Pretty much brand new and hardly used. I was going to use it for astro photography to widen my FOV and cut down on exposure time but I spent the big \$ on a Giant Easy Guider which already includes a reducer. Will thread onto any Meade or Celestron SCT reducing your F10 system to f6.3 for great wide field views. First \$ 75.00 takes it. Contact Tim McIntyre at 668-8322.

**NEWSLETTER OF THE BUFFALO ASTRONOMICAL ASSOCIATION INC.**

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