THE SPECTRUM

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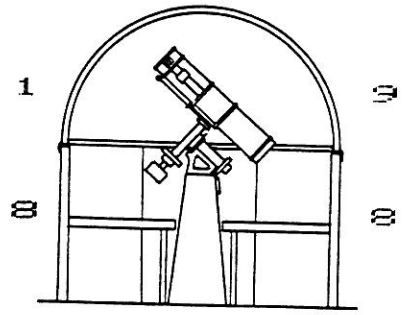
SEPTEMBER



OCTOBER

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SEPTEMBER MEETING

Our first meeting of the 1988-89 season will be held in the auditorium of the State University College at 7:30 PM EDT. Our guest speaker, Larry Hazel, is a long time member of the B.A.A. His talk will be "Galaxies". Larry has been a most interesting speaker in the past and has enjoyed being an A.A.V.S.O. observer, and is currently interested in astrophotography. Lets give our own member a big B.A.A. welcome. Refreshments will follow.....

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OCTOBER MEETING

This months speaker is a former B.A.A. member. A West Seneca native, Phil Cizdziel has a Bachelors Degree in Physics from the University of Buffalo, and a Masters Degree from the University of Hawaii. His talk will be "The New & Improved Infrared C.C.D. Detector". Phil is now employed by the Hughs Corp. of Santa Barbara, California where he now resides. Lets welcome back a former member with a large attendance. Refreshments will follow....

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PRESIDENT'S CORNER

Welcome back to the 1988-89 season of the Buffalo Astronomical Association. Our meetings will be held in th New Science Building Auditorium, State University College at 7:30 PM EDT, on the second Friday of the month, September through December. The January through June meetings are held at the Science Museum.

Many thanks to everyone who hosted Summer Star Parties and to Al Kolodziejczak for organizing them.

Our coffee pot is looking for someone to bring it to the meetings. Volunteers are needed to tak care of the refreshments. Lets try to keep this a part of our meetings as everyone seems to enjoy our social coffee and doughnuts. Looking ahead, volunteers will be needed to help with the Christmas Party. I would especially like to encourage our new membes to get onvolved. This is a good way for us to know you.

Bob Hughes has resigned as observatory director. This is a very responsible and time consuming position. We neec someone who can run Public Nights, usually the first and third Saturdays, especially tour groups during the week, and maintain the scope. It would be unfortunate for the club NOT to utilize this fine scope as a means of informing and sharing the beauty of the universe with non-members. Any help will be greatly appreciated. A fee is paid to anyone volunteering to do a Public Night.

The next meeting of the board will be held on Tuesday, September 6, 1988.

Darwin Christy has been elected by the board members as the editor of the "Spectrum" for another season. He has accepted this position.

At the June meeting, Carl Milazzo compiled lists of the largest Amateur Telescopes telescopes of the members of the B.A.A. and Women in Astronomy. Copies are still available at the membership desk.

Would you like to make comments or suggestions about our club's activities or meetings? There will be a suggestion sheet on the membership table every month. Any written comments or suggestions will be rwad at the next month's meeting.

GET INVOLVED

Doris Koestler, Pres.

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A Brief History of Time

by Stephen Hawking.

Imagine a universe where an electron shot at a screen with two apertures in it passes through both openings simultaneously. Imagine a universe in which there exist particles with 1/2 spin-- particles which look the same not after they pass through one complete revolution, but only after they pass through two. That, according to the laws of physics as explained in Stephen Hawking's new book, is our universe, as it actually exists. I understand about 1/2 of this book-- or the amount you can absorb by turning the book rapidly through two complete revolutions-- and it gave me exactly 17 headaches trying to comprehend some of the principles expounded. But I found it engrossing reading nonetheless,

Hawking attempts, in this slim volume, no less than to present as complete a picture as possible of the physical universe. He begins by recapitulating some of the simpler phenomena of physics, things any first-year student of physics would know. (Having taken elementary physics, but no further, I found this the easiest going in the book.) He demonstrates, for instance, how Galileo and Copernicus refuted the idea that the Earth is the center of the universe, or the solar system. Then, he goes on to explore relativity and discusses Einstein's finding that not only is space relative, but that time is as well. He also expounds on Einstein's idea of curved space.

Eve tually we get to what is the crux of the book, the subject with which Hawking has dealt in most of his career as a theoretical physicist-- black holes and, more specifically, the big bang which many physicists believe marked the beginning of the universe. Einstein's theory is unable to explain the existance of a big bang-- all laws of physics would break down in such a "singularity". But Hawking states that if we combine relativity with the laws of quantum mechanics, such a "singularity" can be explained.

The picture he presents of the universe, therefore, is one that is "unbounded", one that is limitless in time. The universe will eventually shrink because of the effect of gravitation, and another big bang will eventually occur. The cycle will repeat itself endlessly. In such a universe, Hawking states, "The Creator has nothing to do." There was always a universe, and there always will be.

Among the more interesting findings of the book are that black holes are not really black holes after all. They emit radiation-- particles formed right at the "event horizon", the area from which no particle can escape, might conceivably escape while its antiparticle is absorbed. Hawking concludes his book by stating that all of the problems of physics will be solved within the next twenty to thirty years, rendering the science all but obsolved. After that, 'physicists' will concern themselves solely with predicting events within the limits allowable by quantum mechanics-- the uncertainty principle of Heisenberg showed that the position and direction of an eletron cannot be determined precisely, but that they fall within certain limits. He also introduces the concept of "string theory", the idea that particles are not so much particles as strands. This story, according to Hawking, could go a long way to solving mysteries such as the nature of gravity. But, as in many parts of this volume, Hawking tries to present his case in such simple terms that he is vague and confusing. Too much material is left out.

Lest I leave you with the impression that Hawking is overly intellectual, let me assure you that interspersed throughout the book are little jokes and personal anecdotes. For example, there is the bet he has with another physicist that black holes do NOT exist-- if he loses, his life work is vindicated; if he wins, he is a washout as a physicist but at least he gets a three-year subscription to a magazine. And there was also the wry comment that at one time Nobel Prizes seemed to be awarded solely to those who proved what physicists can NOT know.

writing such a mind-boggling book. But he does present some engrossing questions and quandaries, and does much to introduce the reader to some of the finer concepts of physics.

Tom Santa Lucia

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Spy and Tell

Fred Price has a very fine article, "The Future of Amateur Earth-Based Lunar Observation," appearing in the Selenology summer '88 issue of the American Lunar Society.

Larry Hazel and Chris Krstanovic are rebuilding Larry's solar telescope. Chris is helping with the photo electric guider. Larry is also correcting the lens in his 12" f3.8 reflector to flatten the field of view. In addition, he is busy doing gas hypering for photographing deep-sky objects.

Doris Koestler and her daughter, Lori, took a trip to Amish country in Lancaster, Pennsylvania, as well as to Gettysburg, for the week which started August 6th.

Brian Fallon is making a fiberglass tube for his 13" Dobsonian telescope.

Ed Lindberg has been a ham-radio operator for many years and speaks with many of his friends around the world. He talks to one of his friends in Chile on Sunday afternoons, who reports that they are having a mild winter down there.

Gary and Paul Kielich have been doing piggyback astrophotography at Beaver Meadow using Konica 3200 with good results.

Jack Empson and two of his daughters went on a camping trip to Watkins Glen the weekend of August 11th.

Gene Witkowski has a 9 foot kayak which looks like a pea pod. He launches it at La Salle Park and goes into the Erie Basin Marina. He has taken it out into the lake and has enjoyed making friends by waving to boaters.

Peter Michael Goetz, son of Irv and Esther, is appearing in the new TV series of The Cavanaughs which started August 8th.

Former member, Michael Idem, is making a 36" f.5 telescope which he will be housing in a 20' tall observatory which he is building.

Hugh Pettit is, at last, the proud owner of the CAT (Computer-Aided Telescope). After a long wait, Hugh received it on August 1st. He also now owns a Meade 8" Model 2080/LX5. He gave his 2080/LX3 to his grandson, BAA member, David Richter.

Ed Czapla has constructed a concrete runway from his garage to the center of his back yard for use of his telescope. Ed may purchase a 17½" mirror after Ed Lindberg checks it and finds it to be all right.

Orrin Christy and a boater friend were the announcers for the Grand Prix boat race at Isle View, on the Niagara River at Tonawanda. Orrin and another friend entered the Seika Challenge for boat building. There were two parts: (1) they were timed on how fast they could build their boat. In this they won 2nd place; (2) on another day, they raced their boat in the canal, winning another 2nd place, giving them 2nd place for the entire event.

At the Grand Prix auto race in Niagara Falls, Orrin's name was listed on the program. He helped with security and also helped with seating.

Edith L. Geiger

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FOR SALE

Edmund Scientific Reflector - 4" - 60" focal length - carrying case for scope and lenses include 60x, 120x, 240x and a Barlow - asking $375.00 - Paul Kutlina - 1902 Welch Ave., Niagara Falls, N.Y. 14303 - phone 716 - 284-8304.

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The science of astronomy advances steadily, continually adding new details to our already extensive knowledge of this fascinating study. From this wealth of detail we formulate, from time to time, new concepts about how the universe and its contents are organized. These new concepts develop at a much slower pace than do the details. To assess this progress one needs a wide time base, like an astronomy book written decades ago.

I found just such a book, The Universe Around Us, written by the famous Sir James Jeans in 1929. Unlike many books that deal only with fact, Jeans' book attempts to bring the lay reader up to date about astronomical theory and research. It doesn't address the temperature on Mars, or how to observe Jupiter or which stars are variable; it covers broader concepts like the age of the universe, the origin of the solar system and how stars generate energy. All in the light of the state of knowledge in 1929. This article is a sort of book review, but it concentrates on where Sir James and his collegues went wrong.

I should note there is risk of criticism when writing about mistakes made by famous people. Someone will surely resent my having done it. However, this is not just a review of Jeans' errors. He just happens to be an author expressing the conventional wisdom of 1929 astronomy for the general public. These views are shared by many of his colleagues. It is not the errors astronomers make for which we remember them; we remember them for what they got right. Things that add to our accumulation of knowledge, and in this Jeans did his share.

We are accustomed to thinking that everything in astronomy gets bigger or older as we learn more about it. The Galaxy has more stars than we thought, the universe gets bigger, we see objects further away, we record more energetic events, etc. In reading Jeans I find an exception. His 1929 estimate of the age of the universe is a thousand times the present estimate of about ten billion years. Even more surprising, Jeans could justify this great age in a number of different ways.

The cornerstone of his argument is the "equipartition of energy". This concept is important in the study of the interaction of gas particles. On a grander scale, the distribution of stars in the Galaxy is similar to the distribution of particles in a gas. According to the equipartition theory, all particles acquire the same energy if they are allowed to interact for a long enough time. So, a massive particle ends up moving slowly while a light particle moves rapidly because energy is dependent on mass multiplied by the square of velocity. If mass is high, velocity is low.

Two astronomers, Halm in 1911 and Seares in 1922, determined that heavy stars move more slowly than light stars, and thus, the equipartition of energy holds for stars. Jeans notes that gravitational interaction between stars makes this possible, but the time scale calculated for this phenomenon to have taken place is five to ten trillion years!

According to Jeans, confirmation of this age for the universe comes from the distribution of eccentricities in the orbits of binary stars, from the composition of stellar masses in moving clusters and from the ratio of stellar masses in binary systems. The details of his reasoning are too lengthy to cover here, but the point is that convincing arguments can be found to support erroneous ideas. I can't recall reading about any of these three points in modern astronomy books, much less the "equipartion of energy".

We had only begun to understand the evolution of stars in the late '20s. Much observational data about stars had been obtained, but some critical points were still cloudy. One was that stars were thought to start out their lives as red giants, then evolve onto the main-sequence, and finally become white dwarfs in their old age. Also, it was believed that all stars formed at the same time and that their radiation and mass diminished dramatically as they aged.

The nuclear processes that generate a star's energy were very unclear in Jeans' day. Einstein's relationship showing that mass could be transformed into energy was widely accepted - but how did it work in stars? Jeans thought that orbiting electrons would eventually fall into the nucleus of the atoms that make up the star and annihilate protons, thereby converting mass to energy. He believed a star formed with a variety of different kinds of atoms. Some of them reacted quickly, which explains why stars were so luminous early in their lives. Later, atoms that reacted more slowly provided energy, but at a reduced rate. Since atoms exhibiting these properties were not seen on Earth, Jeans concluded that the sun contained atoms heavier than any found here.

A problem resulted from this reasoning. Knowing the energy-mass relationship from Einstein's equation, and recognizing the mass-luminosity law, which Jeans gives as luminosity being proportional to the third power of mass, it is possible to extrapolate backwards over the seven or so trillion years of the sun's existance and arrive at enormous numbers for its early mass and luminosity.

What about stars that are currently much heavier and brighter than the sun? If all stars were born at the same time, a necessary condition for the equipartition of energy to have had time to work, then stars that are very massive now must have been incredibly massive to begin with. Jeans postulated a long period reactions just as other stars had, but they would remain mo massive because of their delayed start. We see them radiati copiously now just as a normal star, like our sun, had do trillions of years ago.

Jeans explained this lengthy period of "arrest development" by speculating that these stars were similar super-massive white dwarfs having few orbiting electrons th could combine with protons to produce energy. He express concern because there was little observational evidence support this idea. But he hoped that the central stars planetary nebulae might prove to be the type of object neede Clearly, in 1929, the nature of planetary nebulae remained to better understood.

Another idea which is no longer accepted is that stars a partially liquid. Again, there was corroborating evidence support this position. Liquid stars were required to explain t existence of spectroscopic binary star systems - double stars close together that they cannot be resolved with a telescope. T argument for liquid stars proceeds from the principle that sta lose huge amounts of mass as they age and therefore rotate faste and faster. Eventually they shed material which then forms close companion star. In other words, spectroscopic binarie develop as the parent star ages, not when the star firs condensed as we now believe. Jeans points out that if a gaseou star sheds material the gas would disperse into space and neve form a second star. But a liquid star would elongate into cigar-shape that would stretch out until one part detached fro the other to create another star.

Jeans also states that if stars were wholly gaseous the would explode or would either expand or contract without limit The only escape from this dilemma is for the rate at which matte annihilates in the core of the star to be dependent temperature. However, radio-active decay, the only nuclea behavior reasonably understood in those days, was not affected b temperature. Scientists assumed, erroneously it turned out, tha the more energetic process at work in stars would share thi property. Even a partly liquid composition, according to Jeans would suffice to produce stable stars.

More or less accurate information on the Milky Way and othe galaxies was available at the time this book was written. Jean estimated the Milky Way contained between 30 and 100 billio stars and had its center in the general direction of Scorpius Ophiuchus. The sun was placed nearer to the edge than to th center. Current estimates have about ten times the number stars, and the center is in Sagittarius.

Other galaxies were recognized as huge clouds of stars, bu all were smaller than ours because the scale of the universe wa in error. Using Cepheid variable stars as a guide, the distanc to the Andromeda galaxy had been determined to be only 900,00 light years. Because it was thought to be so close the tota stellar mass of this system was estimated at a mere 3.5 billio solar masses. We now measure this distance to be more than tw million light years and believe the Andromeda galaxy is mor massive than the Milky Way.

Because matter was being converted into radiation fo trillions of years it was thought that the galaxies were muc smaller in the past than they are now. With more mass th gravitational hold on the individual stars would have bee greater in the past, and the system would be more tightly boun and therefore smaller. The size of the galaxy was assumed to b doubling every 30 million years in this epoch. Trillions of years ago, when stars were radiating much more actively and had much higher masses, the galaxy must have been exceedingly compact b this reasoning.

One of the most significant changes in astronomical theory in the last sixty years is how the solar system formed. In Jeans' time the accepted scenario was that a star passed close to the sun and gravitational interaction drew one or more arms of material from the it. These arms broke up to become the planets. The thickest part of the arm would develop when the two stars were closest. Before and after closest approach the filament of matter would be thinner, nicely explaining why the middle planets in the solar system, Jupiter and Saturn, are the most massive while those nearer or further from the sun are less massive.

The initial orbits of the planets would be highly elliptical as a result of their violent birth. How then did they come to be so nearly circular? Initially all sorts of leftover debris would litter the solar system. The orbits would become more circular as the planets interacted with this material. In time, the debris was swept up by the planets and has disappeared.

The satellites were born while the planets had highly eccentric orbits that brought them near the sun. The sun now played the role of the passing star, pulling material from the planets to form the satellites. Large planets remained gaseous longer than small ones, so they were more susceptible to having gas drawn off. Hence the bigger the planet the greater the number of moons - exactly in accord with the structure of the solar system.

This event took place four billion years ago according to an analysis of the time required to establish the present relationship between the moon's distance from the Earth and the Earth's rotation rate. This agrees well with the current estimate for the age of the planets, except modern theory holds that the sun was born at that time as well. Jeans noted that approximately

close passage between stars would be extremely improbable, making solar systems rare. Since the age of the stars had been estimated to be one thousand times higher than we now believe, the actual number of stars with planets would now be reduced to only one in one hundred million. The sun with its planets would be an extremely unusual star if we still accepted the cataclysmic explanation of planetary formation.

How different now are our views about these same topics - from the structure of stars to the birth of the solar system. Yet, most of these rejected theories were supported by observational evidence and vigorous reasoning that we would find convincing today. One can't help wondering if current theories in astronomy and cosmology will suffer the same fate as did so many of the conjectures covered in this book. Imagine, noted scientists observing and analyzing for years to prove a theory is valid, only to have their work discarded when a new, more comprehensive hypothesis is proposed. Perhaps that is the nature of research and the process by which scientific progress is made.

Rowland A. Rupp

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INSTRUMENT NOTES

The serious amateur observer needs to give some thought to the subject of eyepieces. There are questions of type, of quality and of proper focal length to match the objective. Even if you have acquired a commercially made telescope supplied with a set of eyepieces, your problems have not been completely solved.

A big problem of telescope manufacture is competitive pricing. The maker seems to have to cut corners on quality in order to stay competitive. He has to avoid reducing mirror quality too much as negative word of mouth advertising would be disastrous. But the mountings seem to be fair game as many users have found to their dismay. Another area is eyepieces as a selling point "to give a range of powers". But eyepiece quality will probably not be mentioned. Also there is no reference as to whether any one of the set is at or near the ideal focal length for the objective. Here the amateur needs to do some computation.

In order to select the optimum eyepiece focal length for your objectives you will need to observe some simple relationships. First is the exit pupil of the telescope. The exit pupil is the diameter of the cone of light leaving the eyepiece and entering the observer's eye. To find this value, divide the diameter of the objective mirror or lens by the power of the system with that particular eyepiece. For instance, a 10-inch mirror of 100 inch focal length would have power of 100 with a one inch eyepiece and the exit pupil would be 10 divided by 100 or 0.1 inch. This value is also 2.5 mm as there are 25 millimeters to the inch. You can do the calculation in either inches or millimeters but don't put both values into the same calculation. Sometimes you do this without thinking and you get a wild answer.

The next factor to consider is the pupil of the observer's dark adapted eye. This is partly a finction of the age of the observer. For a teenager the eye may open to 7 or 8 mm. For a senior citizen this figure may be only 3 mm. In between these limits a good average estimate is 5 mm. The important thing to remember is that the exit pupil of the telescope should equal or nearly equal that of the eye pupil. So, of your system has an exit pupil of between 3 and 6 mm, it should perform very well.

Try some sample computations with your own telescope. For a 6-inch f:8 telescope you can call the focal length 50 inches. If you rearrange the equation that was just mentioned so that it is expressed in terms of what power would be the ideal for your system, we find that power equals objective diameter divided by exit pupil. Given a 10-inch f:5 mirror, what is the optimum power? Optimum power equals 10 divided by 1/5 giving 5 power. We could have changed the mirror diameter figure to 250 mm and divided by 5 mm to get the same 50x for the power value. To get a power of 50 we would need an eyepiece of one inch or 25 mm focal length. If the mirror is good it would be very worth while to buy a one inch Branden Orthoscopic for this telescope. For the Beaver Meadow telescope the figures for 12 inch diameter and 80 inch focal length give A one incher would also be good. If these were Branden Orthoscopics good performance could be predicted. To determine the best set of eyepieces for your telescope shoot for an exit pupil of between 3 and 6 mm and get a good orthoscopic of the best focal length.

This discussion has been aimed at finding the eyepiece that would enable a user to test the ultimate performance of his telescope. Of course, for higher powers shorter focal lengths are giving smaller exit pupils. As the power is increased the observer may think that his mirror is incapable of giving this high power. It may well be that the exit pupil is too small to transmit the information. And when real low powers are used to get a richest field it may well be that the bundle of rays is so large that the edges spill over and never reach the eye. The observer is effectively reducing his objective diameter.

Also, the new Hi-Tech oculars have not been considered as they are not cost effective for the average amateur. The Ploessels and Cleves from France are superb performers but not greatly better than orthoscopics for most of us, and, who can pay up to $400 for a single eyepiece? We used to get good Kellners from military surplus for $5. Indeed, times have changed.

Ed Lindberg

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KELLOG OBSERVATORY REPORT

Summer Sun Shows at the Buffalo Museum of Science took place daily during July and August. As of August 5th, attendance totaled 2,215 (an average of 91 per day). Assistant Astronomers Dan Kujawinski and Marilou Bebak along with 3 high school volunteers, Nancy Adams, Asif Mohamed and Kristen Lewandowski, welcomed visitors from 34 states and 15 countries. Notables include 40 New York State top science students attending a 3 week Summer Science Institute at the University of Buffalo. (Past BAA President Ken Biggie's son Kevin was part of this group). Their studies include visits to area scientific facilities to see science careers in action. A visit from 2 amateur astronomers from Indiana prompted a letter stating, "Even though we have visited many observatories and planetariums, the Kellogg Observatory offered several things we had not seen before. Your emphasis on solar study is exceptionally well conceived and executed. You certainly do run a unique program."

Daily observations of the sun were made through the Museum's heliostat, spectrograph and 8-inch refractor with H-Alpha filter. (See Observations Column for details.) Several visits were made by BAA member Dan Marcus who assisted the public and devised a way to photograph sunspots using the heliostat. BAA member and Museum of Science Instructor Bill Rogers attempted to use a video camera and monitor to view solar prominences through the 8-inch refractor. Due to problems with contrast and glare this was only partly successful. Several people have remarked that there are video cameras and monitors specially designed for use with telescopes. Anyone with information on such a system should contact Marilou Bebak at the Museum of Science, 896-5200 or at home, 627-2333.

Marilou Bebak

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CALL FOR VOLUNTEERS !!

Would you like to share your knowledge of astronomy? Do you like to meet and talk to people? Do you want to learn more about "hands on" astronomy? The become a volunteer for public nights at the Kellogg Observatory! Public nights are every Friday night, September through May from 7:00 PM to 9:00 PM at the Buffalo Museum of Science. You can come for just one night or several. INTERESTED? Call Marilou at 896-5200

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ASTRONOMICAL HAPPENINGS

SOLAR-------

10-11, and will only be visible from the Indian & Pacific Oceans (but NOT Hawaii). Notice the double dates, that is because it will occur across the international date line - what? Another event by the Sun will be its crossing of the celestial equator on September 22nd at about 2:29 PM EST.

LUNAR-------

The phases for September will be Last Quarter Moon on the 2nd; New Moon on the 10th; First Quarter Moon on the 18th; and Full (Harvest) Moon on the 25th. For October they will be Last Quarter on the 2nd; New Moon on the 10th; First Quarter Moon on the 18th; and Full (Hunter's) Moon on the 24th.

LUNAR CONJUNCTIONS-------

For September:- Jupiter on the 2nd & 30th; Venus on the 6th; Regulus on the 9th; Mercury on the 13th; Antares on the 17th; Saturn & Uranus on the 18th; Neptune on the 19th; and Mars on the 25th. For October:- Regulus & Venus on the 6th; Antares on the 14th; Saturn, Uranus & Neptune on the 16th; Mars on the 22nd; and Jupiter on the 17th.

PLANETARY CONJUNCTIONS-------

For September:- Venus & Regulus on the 4th; and Saturn & Uranus on the 17th.

OTHER PLANETARY EVENTS-------

For September:- Uranus stationary on the 5th; Mercury at greatest elongation (27° E) on the 15th; Neptune stationary on the 18th; Mars closest approach to the Earth on the 21st; Jupiter stationary on the 24th; and Mercury stationary on the 28th. For October:- Mercury at inferior conjunction on the 11th and is stationary on the 19th, also will be at greatest elongation (18° W) on the 26th; and Uranus stationary on the 30th.

METEOR SHOWERS-------

On September 1st, the Aurigids, a minor shower, will be seen radiating from R.A. 05h 40m at +42° declination. It is an irregular shower with, perhaps, 5 to 10 hourly of a white 4th magnitude short strak. It can only be detected for a period of about 24 hours. More observational data is needed. Other showers this month include the Beta Lacertids on the 1st; Epsilon Perseids on the 11th; Southern Piscids on the 20th; Kappa Aquarids on the 21st; Alpha Aurigids on the 22nd; and Sextantids (day-time) on the 29th.

On October the 3rd, the Andromedes, another lesser known shower will appear from R.A. 01h 20m at +34° declination (and/or from R.A. 01h 20m at +34°, which ever you should choose). It has been a confusing shower although it is an annual shower with a duration of 48 days. Average magnitude is 4 with a whitish hue. One fact about it is, there are only about 3 to 7 showing up from those two radiants. Try it out---you might find that there are two distinct showers which could clarify it into two individual showers once and for all. Other showers for October iclude the Quadrantids on the 2nd; Giacobini-Zinner Comet (1985) of the 8th; Draconids on the 9th; Northern Piscids on the 12th; Epsilon Arietids on the 17th; Epsilon Geminids on the 19th; Orionids on the 21st; and Leo Minorids on the 24th.

GOOD OBSERVING !!!!!!

Darwin Christy

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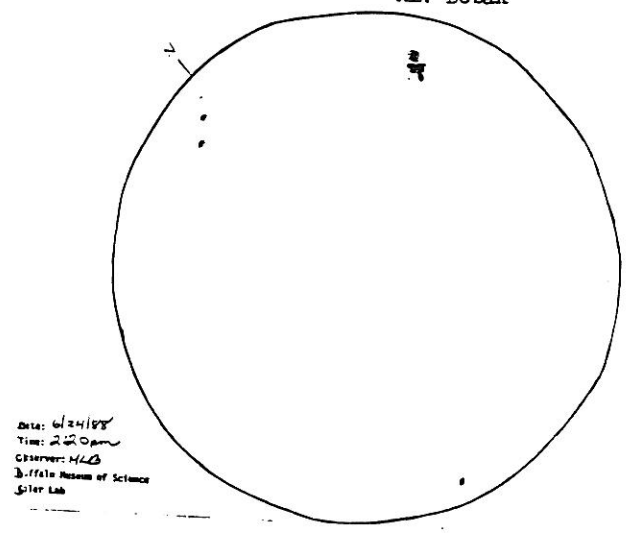
OBSERVATIONS

The following observations were taken at the Kellogg Observatory at the Buffalo Museum of Science.

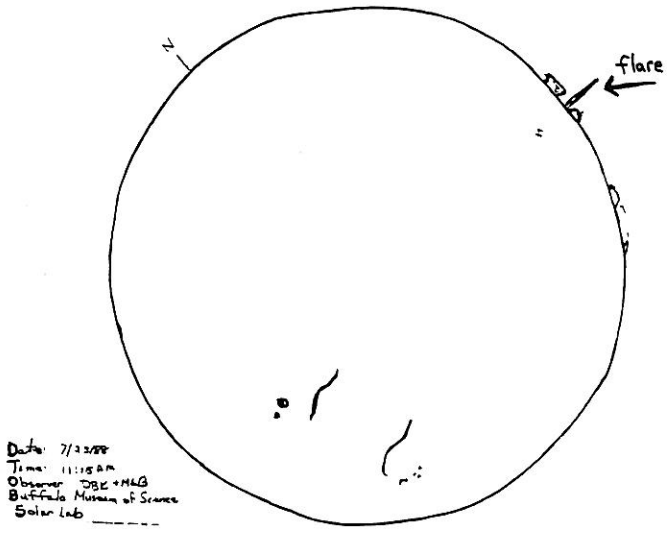
On Friday, June 24th, 1988 at 2:00 PM, I received a call at the Buffalo Museum of Science from Dan Marcus who had seen a large sunspot near the sun's limb. Dan's viewing method was quite interesting. In the building where Dan works at Bethlehem Steel, there are holes in the roof where there are missing rivets and screws. These holes act like pin-hole cameras, focusing the sun's image on the floor. Even on this tiny image Dan could see a very dark spot. Thinking this must be a large sunspot group, Dan phoned me at the Museum. Bill Rogers and I set up the heliostat and observed a large and complex group. Bill tried unsuccessfully to use photostat paper to record th group, while I made the following sketch, Thanks Dan!

ML. Bebak



The average sunspot number for June 1988 was 101.8, an hasn't been that high since May of 1983. The sun continue to be quite active during July and August. Filaments, plage areas, spicules, solar prominences and sunspots wer routinely seen all summer. Sunspot tracings were taken daily July and August. Marilou Bebak observed 3 solar flares. 2 were observed on June 29th. The first was a sudden brightening within a small sunspot group at 9:30 DST lasting 5 minutes. The second was a ribbon-like brightening within a large sunspot group lasting two minites. The third flare seen was also observed by Dan Marcus and Dan Kujawinski on July 25th at 11:45 DST. An extremely large spike-like prominence was observed along the western limb of the sun at 11:15. This spike intensified and at 11:45 was accompanied by a brightness and lasted for 10 minutes. After the bulge disappeared the huge spike quickly faded and was gone by 12 noon. Ernst Both indicated that this was typical of a surge flare. (See tracing below)

Marilou Bebak



Since I rarely observe anymore I seldom have anything to contribute to this column. But I did observe on Saturday, June 18th, at Beaver Meadow, although somewhat by accident. I thought I would go for the public night and, at the last minute, decided to take my six-inch telescope to see if it still worked (it barely did) and perhaps give the public another telescope to use.

I told them I was not. (I couldn't even remember the combination to the observatory.) As I set up my telescope more would-be viewers arrived. I ended up conducting a make-shift public night myself when it became apparent that nobody else was going to do it. I'm sure that for the public it wasn't the same as being in the observatory using the big scope.

During the course of the evening, which was clear with a crescent moon, roughly thirty people showed up. Some grumbled that a public night had been announced in The Spectrum and in Gusto, but nobody came to run it. Others noted that public nights were run by volunteers who may not have wanted to give up a Saturday night. One generous soul offered that possibly someone's car broke down while enroute.

I concentrated on objects I was confident I could find easily. The moon and Saturn were up. We looked at double stars like Albireo, Mizar, Cor Caroli and Gamma Virginis. I found M13, M27 and M57, which for me constitute deep-sky objects. All-in-all we had a pretty good night. As the last people were leaving the moon was low enough for the Milky Way to become visible. I wondered how many who had left earlier could recall the last time they saw it.

We should find a way to alert our guests when a public night is cancelled; many people stood around for a long time waiting for someone to show up. That's bad public relations for both us and for the Beaver Meadow Audubon Center. Maybe we can contact someone at the center who could post a cancellation notice. Someone may have tried and failed - I saw no sign of life at Dave's house. Let's hope future public nights go better.

Rowland A. Rupp

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Last year, Tristan Dilapo won a photograph of the Virgo Cluster of Galaxies taken by Tom Dey. Tristan later compared it with the Tirion charts, and noticed that a fairly bright fuzzy object was not on the charts. On June 3rd, I visually confirmed that there is a fairly bright galaxy, and not a comet. During a July star party, with the help from Larry Hazel and his NGC-IC catalogue, we compared it with the Uranometria charts, where it was not listed. It turned out to be IC-3409 which is on the Smithsonian Astrophysical Observer's chart. It is catalogued as a 15th magnitude object by mistake, but to me it looked more like 12th magnitude. Reports of this galaxy have never appeared in Sky & Telescope, Astronomy, Deep Sky, Burnhams or Webbs. With my jointly owned 26-inch Dobsonian scope, IC-3409 was 3x2 arc minutes in size, of medium surface brightness, with a bright hub. It is located one degree northwest of M-88, or half way between NGC 4419 & IC-3453.

The Super Nova of 1672, also known as Cass-A and MIL 93, was seen on July 17th. With a UHC filter on the 13mm Nagler and the 26-incher, two tiny 16th magnitude blobs were detected. What helped a little in finding the exact location in Cassiopeia of Cass-A, was two faint but obvious double stars.

That same night, the brightest and easiest Palomar Globular cluster was seen. When I first saw it, I thought it was a bright ghost image from the 6th magnitude yellow star, 35 Sagittarius. It is 10 arc minutes S.E. of the bright star and within its 3 arc minute unresolved disk, are 3 10th magnitude foreground stars. This globular is known as Palomar 9. It has a very bright core that is almost stellar in size. Its hard to believe that such an easy object wasn't discovered by the many great astronomers as far back as in William Herschel days.

A meteor left a glowing train for 7 minutes at 1:25 AM on August 7th, as seen from Brian Fallon's star party. It was white, traveling 10 degrees across Aquila in 1/2 second towards the west and yet was only first magnitude.

Carl Milazzo

* * * * *

ASTRONOMER from the PAST

Thomas Jefferson Jackson See, an American astronomer and mathematician, was born on February 19, 1866. In 1884 he entered the University of Missouri and graduated in 1889 at the head of his class, with A.B., L.B., and S.B. degrees. From 1887-89 he had charge of the university's observatory. He received the Missouri Astronomical Medal for an original thesis on the origin of binary stars. After this achievement, he immediately enrolled at the University of Berlin for postgraduate study. In 1891 he Berlin. On December 10, 1892 he graduated from the university with high honors, and received both A.M. and Ph.D. degrees. He returned to America on Christmas Day 1892.

From 1893-96 he organized and served as director of the department of astronomy at the University of Chicago and helped in the establishment of Yerkes Observatory in 1894, which was to be part of the university.

In 1896 Dr. See, as astronomer at Lowell Observatory, entered upon a survey of southern double stars and nebulae for the observatory. During a two year period at Flagstaff and Mexico City, he examined, with a 24-inch telescope, some 200,000 fixed stars between 15 and 65 degrees south latitude. He discovered over 600 new double stars and measured about 1400 systems previously reorganized by Sir John Herschel, as well as other astronomers of the time. He was the first to formulate the wave theory of solid bodies and of the cosmic ray.

Dr. See lectured on sidereal astronomy at Lowell Institute in Boston, Massachusetts, December-January, 1898-99, and was immediately appointed by President McKinley as professor of mathematics for the U.S. Naval Academy in Annapolis. From 1899-1902, he served as director of the U.S. Naval Observatory in Washington. While on duty at the Naval Observatory, with the 24-inch telescope, he again observed double stars and satellites, and also measured the planets and satellites by day and night. From these studies, he deduced the absolute diameters and constants of irradiation of the chief bodies of the solar system. He also investigated the position of Laplace's invariable plane of the solar system.

In 1903 he was appointed to the Naval Observatory on Mare Island, California, serving as director. During 1904-06 he carried out important researches on the moments of inertia, internal densities, pressures, temperatures and rigidities of the heavenly bodies, earthquakes, etc. He eventually conducted further research in regard to the origin of the solar system, the cause of land and water hemispheres of the terrestrial globe, gravitation, etc.

Dr. See was a brilliant man and worked diligently on his vast astronomical interests. Though he made no real important contributions to science, he is remembered for his controversial papers on astronomical subjects and for his knack of supporting the discredited side of scientific theorites.

Some of his publications are as follows: Development of the Double-Star System (1893); Researches on the Evolution of the Stellar Systems (1896); Researches on the Physical Constitution and Rigidities of the Heavenly Bodies (1904-06); Discovery that Aether Waves are the Cause of Universal Gravitation (1927); Nonsensical Theory of Expanding Universe Demolished (1940); All the Disturbances of the Moon's Motion Fully Explained (1942); Invariability of Sidereal Day (1949-50); along with several double star and variable star catalogues.

Dr. T. J. J. See died July 4, 1962 at 96 years of age, in Oakland, California, where he had retired in 1950.

William Larkin Webb did a biography in 1913 called Brief Biography and Popular Account of the Unparalleled Discoveries of T. J. J. See.

Darwin Christy

* * * * *

HOROLOGIUM, the Clock, is one of LaCaille's inventions. The undistinguished area it covers is supposed to have been given its name, by LaCaille, that the voyagers of the ship "Argo" might not lack for the time of day. Originally it was called Horologium Ascillatorium, or the Pendulum Clock, only to be shortened in the 17th century.

Horologium is located between Eridanus on the north; Hydrus on the south; Caelum, Dorado & Reticulum on the east; and by Eridanus & Hydrus on the west.

Objects of interest are:- Galaxies, NGC's 1249, 1411,

I,2035. One Globular Cluster, NGC 1261 and Variable Stars, R, T, TV, TW, U & V.

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PICTOR, the Painter, so named by LaCaille, is another southern obscure constellation. Its original name was Equuleus Pictoris, the Painter's Easel but later changed to the shorter Pictor.

It is located within the constellations Caelum & Columba on its north; Dorado & Volans on the south; on the east by Carina & Puppis; and on the west by Dorado & Caelum.

Objects of interest are few. Galaxies include NGC 1705; Double Stars, Eta[1], Iota & Mu; Variable Stars, Delta, R, RR, S, T & W.

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RETICULUM, the Net or Reticle, is another of LaCaille's formations. He called it Reticulum Rhomboidalis, the Rhomboidal Net which was later changed to just 'Reticulum.' It was placed as a memorial of the Reticle he used in making his celebrated observations of the southern skies.

Reticulum is between Dorado & Horologium on the north; Hydrus on the south; Dorado on the east; and Horologium on the west.

Interesting objects include Galaxies NGC's 1313, 1536, 1543, 1559 & 1574; also I,2056. One Variable Star, R being the only other object.

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PISCIS AUSTRINIS, the Southern Fish, has one first magnitude star, Fomalhaut, which from the Arabs means, "The Fish's Mouth." It seems to be a relatively new Constellation, probably from its place in the "Sea of the Heavens" and being situated so far south. The Arabs also had pictured it as a 'frog' and as an 'ostrich' in different epochs in their astronomical history.

Piscis Austrinis lies within the borders of Aquarius & Caprincornus on the north; Grus on the south; on the east by Sculptor; and on the west by Microscopium.

Objects of interest include Galaxies;- NGC's 7135, 7154, 7172, 7173, 7174, 7176, 7314 & 7361; also I,5135, I,5256, I,5269 & I,5271. Double Stars are:- 6, 8, 11, Beta, Gamma, Delta & Eta; also Variable Stars, Pi, S & V.

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HYDRUS, the Male Water Snake, was first published by Bayer in 1603. Hydrus is the masculine name for Hydra and so---it must be a male water snake, which was needed as a mate for Hydrus.

Hydrus is bordered by Tucana, Eridanus, Horologium & Reticulum on the north; Mensa & Octans on the south; Mensa & Dorado on the east; and Octans & Tucana on the west.

Not many objects of interest lie within its border. One Galaxy, NGC 1511; one Globular Cluster, NGC 643; One Diffues Nebula NGC 602; also one Double Star, Tau[2] and two Variable Stars, UX & VW.

The five above constellations are the last of the 88 constellations to appear. They are all in the southern skies and for the benefit for those who might travel to the south. "Constellations of the Month" may not appear unless I have a request that they keep going, starting anew with the Zodiac. Your comments greatly needed!!!

Darwin Christy

AN INFRARED QUASAR

The original meaning of "QUASAR" is a contraction of the term "quasistellar object" and these objects were also called QSO's by those who didn't like quaint contractions. At first, they attracted attention because they emitted energy at a rate comparable with entire galaxies, and yet they looked like rare blue stars. It has now been a quarter century since such objects were identified as being something that astrophysicists should be interested in.

In the meantime, astrophysicists (never the type of people to be caught without a theory to explain something) have come up with an idea that explains quasars as the blown up pieces of a collision between two galaxies, one of which contains a black hole. The collision provides a large cloud of matter which the black hole is only too happy to gobble up and, in the process, vast quantities of radiation are emitted. The blueness of a quasar results from the extremely energetic nature of the interactions among galactic dust and gas falling around and into the black hole, not from the large total amount of energy being emitted.

Theoreticians might expect that the early stages of a quasar's formation, not too long after the collision, would still involve large quantities of gas and dust outside the black hole. This material ought to block the direct light of the quasar from getting out into the universe at large, thus preventing us from seeing the quasar in blue light. However, the energy of the blue light would heat up the gas cloud as it was absorbed. Any warm object even in deep space, re-emits such energy at a lower temperature, which means that the warm object would radiate in the infrared. So astrophysicists expect that a "young" quasar might be visible in infrared light.

Employing IRAS, astronomers have, indeed, located what they think might be a cool quasar/warm cloud which would be in its early stages of formation.

Peter Jedicke
London Centre R.A.S.C.

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LETTER to the EDITOR

800 West Addition St.
Apt #2
Martinsburg, WV 25401
June 22, 1988

Dear Friends at BAA,

Just writing to let you know what I've been up to since leaving the BAA and the Buffalo area.

I now direct a small planetarium in a school in the Blue Ridge Mountains.

I'm having a busy summer. Late June I'm in Richmond, VA for the International Planetarium Society meeting where I'll deliver a paper on telecommunications & the planetarium.

July 10 to 23rd I'm at the National Radio Observatory in Green Bank, West Virginia studying radio astronomy under a National Science Foundation Grant.

I belong to two local astronomy clubs. Tir-State Astronomers in Hagerstown, MD. and Shenandoah Astronomical in Middletown, VA. There was a picnic & star party at one & a solar observing marathon on the Summer Solstice at the other. The high school has an 8-inch Celestron which I'm using over the summer, but miss Beaver Meadow Observatory. Neither club has anything like it!

Miss all my friends in the club, urge them to write with club news.

Sincerely,
Betty Wasiluk

* * * * *

June 30, 1988

Buffalo Astronomical Association
c/o Kenneth Biggie

Many thanks for the fine tribute to Bob. It is more than appreciated and he would have felt very honored.

Working with the members of the B.A.A. was one of his greatest satisfactions during his retirement years. Nothing pleased him more than being able to help with their problems.

Sincerely,
Verna Mayer

Fellows Award posthumously)

* * * * *

We regret to announce the passing of Verna Mayer on July 20th. She was known to many of our members and her pleasant personality and friendly smile will be missed.

* * * * *

WHAT MOST CLUB MEMBERS DON'T KNOW

At the club's annual dinner meetings an award is given to the outstanding member of the year. Three great members over the past three years have received the recognition they well deserve, BUT the very best club member by far, has been overlooked by that small group; they must have gone blind looking at a sunset too long. The number one club member is Edith Geiger, she has been doing a multitude of major projects for both the club and for her own astronomical activities for 15 years for some and as long as twenty=five years for others. Edith has "created" for every issue of the newsletter with different styles of lettering for "The SPECTRUM". She has been writing profiles every year about our club members and she would loke to write mamny more if she is allowed to. Those profiles really help everyone get to know the 100+ club members and helps spark shared activities of common interest. Edith's Spy & Tell column is like a current event, mini-spy & tell, which is often helpful for becoming involved and keeping up with today's gadgets. Every year Edith shows the funny side of our club with her candid camera shots of those fine members. She has been for years, a member of the board, an officer, on nominating committees, membership chairperson, auditor of the books, hosted and attended most star parties. She has also helped with special committees such as the Mall [illegible] planning details for hosting the NFCAAA and the Astronomical League's conventions here in Buffalo as well as displaying her ma excellent drawings and paintings she has done from her observations of the moon. She is also a deep sky observe having long ago found all the Messier objects and many NGC's as well. Edith made a large list for club members names for those who have found all the M-objects to encourage deep sky observing. And now with her 12-inch scope in its domed observatory, she plans in the very ne future to start doing some astrophotography of deep sky objects.

For the future annual awards, there should be more tha one per year unless it is expected for the members to li to be a hundred years old. And it would be better if all members could submit their candidates and reasons for the awards of the year.

To continue in the next "Spectrum"

Carl Milazzo

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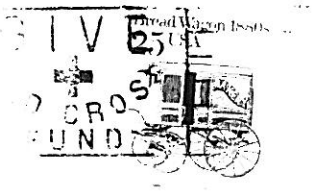

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