WARREN ASTRONOMICAL SOCIETY

The Warren Astronomical Society is a local, non-profit organization of amateur astronomers. The Society holds meetings on the first and third Thursdays of each month, starting at 7:30 P.M., as follows:

1st. Thursday
Cranbrook Institute of Science
500 Lone Pine Rd.
Bloomfield Hills, MI

3rd. Thursday
Macomb County Community College
South Campus
Building B, Room 216
14500 Twelve Mile Rd.
Warren, MI

Membership is open to those interested in astronomy and its related fields. Dues are as follows:
- Student...$10
- College...$15
- Senior Citizen...$15
- Individual...$20
- Family...$25

Sky and Telescope Magazine is available for $16.00 per year, and Astronomy Magazine for $14.00 per year.

Send membership applications and dues to Ken Strom, 61607 Spring Circle Trail, Romeo, MI 48065.

Make checks payable to the Warren Astronomical Society.

OFFICERS
- President: Marty Kunz / 477-0546
- 1st. V.P.: Dan Cwientniowicz / 526-4878
- 2nd. V.P.: Robert Halsall / 781-6784
- Secretary: Tom MacLaney / 541-8198
- Treasurer: Ken Strom / 652-1744
- Deep Sky Group: Doug Bock / 758-9369
- Lunar Group: Alan Rothenberg / 355-5844

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WARREN ASTRONOMICAL SOCIETY PAPER

Editor: Ken Kelly / 839-7250
Send all articles to THE WASP, 19209 Mapleview, Detroit, MI 48205.

The W.A.S.P. is the official publication of the Warren Astronomical Society and is available free to all club members.

NOTES: Newsletters or change of address notices sent to other addresses may not reach the Editor.
All Articles should be submitted at least one week prior to the Macomb meeting.

STARGATE OBSERVATORY

Observatory Chairman: Robert Halsall / 781-6784

Stargate Observatory is owned and operated by the Warren Astronomical Society in conjunction with Rotary International. Located on the grounds of Camp Rotary, Stargate features a 12.5 inch club-built Cassegrain telescope under an aluminum dome. The Observatory is open to all members of the club in accordance with ‘THE STARGATE OBSERVATORY CODE OF CONDUCT’.

Those wishing to use the observatory must call by 7:00 p.m. in the evening of the observing session. Lectures are given at Stargate Observatory each weekend. The lecture will be either Friday or Saturday night, depending on the weather and the lecturers personal schedule.

Lecturer’s List

Lecturers should check with Camp Rotary to determine whether the Scouts are staying at the camp and to inform the Ranger the day and time of the lecture. If you cannot lecture on your scheduled weekend, please make arrangements to switch weekends with another lecturer or call the Chairman as early as possible. The lecturers for the coming weekends are:

July
14/15 Steve Aggas .......... 469-8773
21/22 Bob Keller .......... 781-6853
28/29 Riyad Matti .......... 548-7511
Aug.
4/5 Russ Patten .......... 588-0799

Aug.
11/12 Frank McCullough ... 689-8034
18/19 Clyde Burdette ..... 749-3295
25/26 Steve Aggas .......... 469-8773
Sep.
1/2 Bob Keller .......... 781-6853
W.A.S. COMING ATTRACTIONS

Aug. 3 - Meeting at Cranbrook Institute of Science, 7:30 P.M. A full program of activities is planned.

Aug. 10 - The Cosmology Group will meet at Mike O'Dowd's house at 7:00 P.M. Call 268-7125 for directions. The topic for discussion will be the Probability of life elsewhere in the universe..

Aug. 16 - Total Lunar Eclipse to be Observed from Camp Rotary.
  - Moon enters umbra - 9:21 P.M. E.D.T.
  - Moon enters totality - 10:20
  - Middle of eclipse - 11:08
  - Moon leaves totality - 11:56
  - Moon leaves umbra - 12:56

Aug. 17 - Meeting at Macomb County Community College, 7:30 P.M. A full program of activities is planned.

Aug. 16 - Come to Camp Rotary to observe the total lunar eclipse.
MINUTES OF THE MACOMB MEETING-JUNE 15, 1989

The meeting started at 7:45 with a report on the last board meeting from Marty Kunz. He also explained the new policies decided on at that time. Bob Halsall spoke about the work done at stargate and future plans.

A possible change in Cranbrook policies was brought up. They want to consolidate group meetings to make better use of their facilities. This may mean a change in our meeting time, but may also mean a reduction in fees.

Ken Strom has started looking into tax status for the W.A.S. We may want to gain tax-exempt and tax-deductible status. The first would save us from paying taxes and the other would encourage others to make donations to us. Ken will let us know when he learns the details.

Alan Rothenberg talked a bit about this year’s Apollo Rendezvous at Dayton. It seemed like a good event to go to if you have the chance. Speaking of events, we need to think about our Christmas banquet - it is not that far off. If you know of a restaurant with good banquet facilities, let a board member or Frank McCullough know. Ideas for programming are also welcome.

Alan Rothenberg talked the upcoming occultation of 28 Sgr by Saturn. This should be quite a unique experience, so everyone is encouraged to take part. After the break, Al Vandermarliere gave a presentation on various topics of cosmological interest, with emphasis on gravitation.

Following this, the meeting adjourned about 10:00.

Tom MacLaney
Secretary

MINUTES OF THE CRANBROOK MEETING-JULY 6, 1989

The meeting came to order at 8:12:15. Marty Kunz announced a board meeting to be held at his house on July 27th.

The night's main programming was Alan's report on the recent Saturnian occultation as seen from Las Vegas. He gave a vivid portrayal of the experience of watching 28 Sgr flickering as it passed behind the rings. Beverly Bakanowicz and Riyad Matti also related their attempt, which was unfortunately clouded out.

Brian Klaus followed after the break with a series of terrestrial slides taken under nighttime conditions. These were interesting for their somewhat surreal quality. Your secretary followed with slides of Cygnus, Sagittarius and the Moon. The meeting adjourned after this presentation.

Tom MacLaney
Secretary
As we look around the sky, we see many examples of pairs and groups of galaxies. Some of the examples that most of us have probably viewed first-hand are the Whirlpool galaxy, the Andromeda galaxy and its companions, and MS11NS2. The pairing and grouping of galaxies in the sky can be caused by one of two reasons: either the galaxies are truly near to each other, or one is close to us (astronomically speaking) and the other is far away and they only appear to be close together because of our viewing angle. These three examples, as well as all of the others I'll be dealing with in this article, are thought to be true physical groupings of galaxies as opposed to chance alignments in the sky.

Below I've compiled a more complete table of some of the nearest groups of galaxies. My starting point in compiling the table was Burnham's Celestial Handbook. I leafed through it and listed any galaxy groups that were mentioned and had members listed. I did not list any clusters of galaxies (they are much larger groups of galaxies). All of the groups I found are nearer to us than the Fornax, Virgo, or Coma Clusters, therefore they are among the most studied and best understood galaxies in the sky. Barring extreme changes in our theories of the nearby universe, our listing of membership in these groups will not change significantly. Minor members in these groups will probably be added, but the galaxies listed here will probably not be dropped as members. My next step was to copy down the information for each galaxy from Sky Catalogue 2888.8, Volume 2 (abbreviated as SkyCat from now on).

I then had a listing of the 9 galaxy groups shown in my table. The spacing in the table separates the groups from each other. The three groups mentioned at the beginning of the article, and most galaxy groups in the sky, are composed of one obviously dominant galaxy and one or more companions to that galaxy. To identify the dominant galaxy in each of my groups, I simply took the one with the largest major axis. Since most galaxies are symmetrical, their major axis size is independent of their inclination angle, so this is a simple way to compare the size of galaxies which are at the same distance. Within each group! the members are listed from largest to smallest major axis. As you can see, this order is usually close to brightest-to-faintest order, also.

Listed for each galaxy are several fields, described here:

#: this is simply a number I assigned to each group.
Name: from SkyCat, the name of the galaxy.
Ra: from SkyCat, the right ascension (hours, minutes, and tenths).
Dec: from SkyCat, the declination <degrees, minutes).
Bmag: from SkyCat, the blue magnitude. I used this since it is listed for more galaxies than is the visual magnitude.
Size: from SkyCat, its major and minor axis diameters, in arc minutes.
Type: from SkyCat, the type of galaxy.
RV: from SkyCat, the recession velocity, in km/s. RV is negative for galaxies thought to be approaching us, and positive for those thought to be fleeing.
XS: (excess) the RV of the galaxy minus the RV of the dominant galaxy in its group.

As you scan through the table, an interesting pattern emerges. The RV for a companion galaxy is almost always higher than the RV for the dominant galaxy in the same group! Using the standard line of reasoning, we should see about an equal number of positive~ and negative excess RV's, but we do not. Of the 9 groups in the table, B have more positive excess 9alaxi~s than n~9ative, and only one has more negative excess galaxies. Of the 36 companion galaxies listed, 29 (81~~) of them have positive excess. The excess RV is even more pronounced if we only consider groups which are unambiguously made of a single dominant galaxy and its companions. In the NGC 55, NGC1855, NGC 4945, and M65groups, the second-largest galaxy is more than 3/4 of the size of the dominant one. If we only consider the other groups (M81, NGC 891, M131, M31, and M51 groups) we have 17 out of 17 companions with positive excess. That's a fairly strong correlation, don't you think?

Let's stop here for a moment and review what can cause a recession velocity (otherwise known as a redshift). There are 3 known causes of redshift: gravitational; doppler, and expansion. Which of these can cause the excess effect we're seeing in my table?

I think we can rule out the gravitational redshift. It is caused by the effects of gravity on light. As light leaves a massive object, its wavelength is stretched by the pull of gravity. As it approaches a massive object, its wavelength can be shrunk by the same gravitational effect. But the gravitational field in the companion galaxies should be smaller than that in the dominant galaxies since they are less massive, so if anything, they would receive less gravitational redshift. And the gravitational redshift imparted during departure from the group, and approach to the Milky Way and the Sun would be the same for all group members. Likewise, I think we can rule out the expansion redshift. The expansion redshift is the stretching of the wavelength of light caused by the expansion of the universe as it travels from its source to its observer. If these galaxies are truly group members, then they all have the same distance, and therefore the same expansion redshift from our point of view.
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The doppler redshift is the only remaining conventional cause of redshift which we can use to try an explain the effect. The doppler redshift is caused by the motion of the source or the observer relative to the other. If the galaxies listed are really in their respective groups, and if these groups are made up of a dominant galaxy with companions in orbit around it, then we should expect to see an approximately equal mix of galaxies which are approaching us relative to the dominant galaxy and receding from us relative to the dominant galaxy.

Here are some explanations for the effect that I can come up with:

1. The galaxies are not related to each other. The ones with the higher redshift are background galaxies projected on the sky near to the larger, closer dominant galaxies. The expansion redshift would then be the cause of the excess. However, as I said earlier, according to our best current understanding of the nearby universe, these galaxies are felt to be true physical group members, though, so this explanation would involve radical changes in our current theories of the universe.

2. The galaxy groups I have listed are not a representative sample. I have selected too small a sample of nearby groups and/or I picked those which happen to show the effect. I suppose this solution is possible, but I assure you that I didn't omit any groups that I know of. I believe that they truly represent the nearest galaxy groups to Us. If you know of more well-defined, nearby groups, please let me know so I can apply the same test to them.

3. The doppler redshift explains the effect. We live in a special place and time in the universe. When we look out to the galaxy groups which are nearby, we happen to see more of the companions in the phase of their orbits in which they are moving away from us relative to the larger galaxy. At some time in the past and some time in the future, the orbital periods and positions will again mesh and we'll see all of the smaller galaxies moving toward us. Someone will then write an article for the WASP about the curious negative excess redshifts in the nearby galaxy groups. At most times, we'll see a fairly even mixture of positive and negative excess redshifts. Ludicrous solution! eh?

4. Groups of galaxies are expanding. The companions on the far side of a given group will then appear to us to have a higher redshift than the dominant galaxy, and the companions on the near side will appear to have a lower redshift. Since only nearby galaxies are considered in this article, the near side of a group will be smaller than the far side! so we see more companions with a higher redshift than a lower one. Although this explanation may seem appealing at first, I doubt that any such foreshortening would be evident given the small angular size of the groups being considered here. And if any type of expanding groups hypothesis is used to try and explain the effect, we must ask our-selves why, the groups still show up as groups after 15 billion years of dissipation.

5. There is a fourth cause of redshift and it operates to a greater extent in the companion galaxies (perhaps because they are less massive, fainter, or younger than the dominant galaxies) than in the dominant galaxies. As you've probably guessed if you've read my articles in the past, this is the solution I advocate. This fourth redshift could take on a variety of characteristics and several could be dreamed up to cause an excess redshift. However, my favorite possible cause of a fourth redshift becomes a little more evident if we gaze at the histogram shown below. It shows a point for each companion galaxy in the 5 unambiguous groups, as defined above, and the point for each galaxy is plotted according to its excess redshift. The bins are each 18 km/s wide, centered on the number shown below the bin. For example, the bin marked 60 shows 3 points for the 3 galaxies with excess redshift between 55 and 65. As you can see, the points are generally close to multiples of 72 Km/s, where I've drawn the arrows. Most of you have probably heard of the "quantization of redshifts", and that is precisely the effect we're seeing here. It was found that the excess redshift of galaxies (first, in the Coma Cluster, then later in more clusters and groups) is not randomly distributed, but instead falls near multiples of 72 km/s. That any such effect can show up in such a small sample of nearby galaxies amazes me.
To me, the name "Quantization" brings to mind the quantum theories of elementary particles, in which particles cannot have any old continuous value for their properties but are restricted to multiples of well-defined quantities. An example is what physicists call "spin", A particle cannot have a spin of, for example, 1.7394, but must have a spin of 0, 0.5, 1, 1.5, etc. Perhaps the fourth redshift is something related to quantum effects. Remembering that what we are analyzing to determine redshift is the photon, a quantized particle, it makes sense to me that the fourth redshift could be produced when the light is first emitted from an atom, as opposed to the other three redshifts, which involve something that affects light as it is travelling after emission. As an aside, if such a cause of red-shift exists, the doppler velocities of the companion velocities is lowered considerably (perhaps to just the difference between the measured excess redshift and a quantization peak) and there is no need to invent any observations like dark matter to explain how the companion galaxies can remain in orbit.

This theory is a variation on the old idea that atoms in external galaxies do not behave precisely as atoms do on the Earth. But perhaps there is something inherent in the companion galaxies which causes light to be emitted at a longer wavelength than what we expect, and if that same effect were present on earth, the atoms we measured would do the same, In fact (brace yourself for this one), since the Milky Way is, in essence, a companion to M31, perhaps we are made of intrinsically redshifted atoms and this is why we perceive M31 to be approaching us at high speed. The 59 Km/s approach velocity may be 72 km/s of our intrinsic redshift plus a 13 Km/s recession velocity.

Of course, regardless of what you think about the theory I've mentioned above, do not let it get in the way of the raw observed data. As you look through the simple facts I think you'll find that something is indeed amiss in the standard explanation of redshift. The redshifts of members in the nearest and best studied groups of galaxies in the sky show an effect which is not explainable by the current theories of the cause of redshift. The effect shows up quite well in the nearest sample of galaxies, using nothing more than two widely accessible reference books and an amateur astronomer's abilities to subtract one number from another. To me, the inescapable conclusion is that redshift by itself is not a reliable distance indicator in the universe. I believe that this data and the many other published examples of unaccountable redshift should lead us into a new phase of inquiry in astronomy, to try and explain the observations which our current theories fail miserably to explain.

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GETTING STARTED IN ASTROPHOTOGRAPHY

by Larry F. Kalinowski

PART VIII - NEGATIVE AND POSITIVE PROJECTION

Negative projection photography gets its name from the type of optical device used to project an image on the camera's film. The Barlow lens is a common device used for that purpose. It's popular because it also increases the telescope's effective focal length, which in turn, creates a larger image. Since the Barlow is a negative lens, the system is considered a negative projection system. A telescope eyepiece isn’t required and neither is a camera lens. The image is formed by the Barlow lens.

The f ratio of such a system is always the system f ratio (without the negative lens) multiplied by the magnification factor of the Barlow or negative lens. If your objective was manufactured to be an f8 lens or mirror (Newtonian), then the new f ratio would be eight times the Barlow magnification. This new f ratio is called the effective f ratio.

As you might guess, the positive projection system utilizes a positive lens for its method of operation. However, the lens is usually an eyepiece of some type. In any case, the lens acts like a positive lens; therefore the operation is the same.

The positive projection system is the hardest to implement because the parameters like f ratio and effective focal length cannot be determined until all your equipment is set up. Such things as focusing range, camera or film distance from the eyepiece, depend entirely on your equipment and its limitations. If you change one of the parameters, another also changes. You can calculate the result of any combination of lens distances and focal lengths but whether or not your system will actually be capable of setting up to the combination that you desire still depends on the physical limitations of your system.

Positive projection gives you the greatest range of magnification possible. That’s probably the greatest advantage of the system. The disadvantage is its difficulty to set up and calculate parameters such as focal length and f ratio.

After setting up, the distance between the primary image and the optical center of your eyepiece must be measured. Let’s call that measurement “A”. Then the distance from the optical center of the eyepiece to the film must be measured. This is distance “B”. The optical center of the eyepiece is approximately the midpoint between the eye lens and the field lens. When B is divided by A, the result is the projection magnification. It is the same as the Barlow magnification in the negative projection system. It’s important that these measurements be made after the equipment is all set up and focused. Otherwise, the measurements will change if you refocus.

If you have an expensive eyepiece with 6, 7 or 8 elements, consider the optical center to be the midpoint between the field lens group and the eye lens group. In either case, it should be adequate for our work.
In positive projection the eyepiece changes the f ratio of the primary even before the image is amplified by the projection magnification. In order to determine the final effective f ratio of the system, the telescope magnification (with eyepiece inserted) should be multiplied by the projection magnification, then divided by the diameter of your objective. This system is capable of producing extremely high magnification for astrophotography. A short focal length eyepiece and a high projection magnification could produce very high f ratios in the order of f30 to f100 quite easily. Of course, your exposure time will get increasingly longer because of those high f ratios but your image size grows very large for those tough planetary or extremely small craters on the Moon.

The optics used for positive projection should be the very best you have. You're stretching the performance of your equipment so much that only your best accessories should be used. Using low cost eyepieces isn't recommended. This method uses the most amount of optical elements between the film and your objective. So, it's quite susceptible to image deterioration and light loss. Eyepieces should have the quality of an Orthoscopic design or better. Any eyepiece of lesser design is not recommended.

If you thought it was hard to make guided photographs with the prime focus system, then be prepared for this system. It'll require the best guiding system equipment and setup procedure that you can put together. If your mount, guide scope or camera has any flaws in it at all, this method of photography will really show them up. Only the most experienced photographers should attempt long exposure photographs with this method. Beginners attempting to familiarize themselves with this method should start out taking photographs with short exposures. The Moon and planets are a good place to start. Then they should slowly advance into the deep sky, longer exposure subjects, so the bugs inherent in their photographic system will slowly emerge and corrections can be made to compensate.

If additional magnification is required, it's not unusual to add a Barlow lens in with the eyepiece. This combination would multiply the effective f ratio of the system by the Barlow magnification factor. There are other ways to add even more magnification, however, we begin to reach a point where too much magnification becomes a hazard. The effective focal length of a system reaches its limit at about 100 times the objective diameter (f100). Beyond that point, diffraction begins to destroy the image produced and nothing else of benefit can be gained.

The high f ratios encountered in this type of photography require you to use high speed films (high A.S.A. ratings). As much as fine grain is desired in our pictures, slow films produce exposures of such long duration that they become impractical.

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I used binoculars when I started observing, and still feel they are the best way to begin. The W.A.S. library has two books which will help the binocular observer.

"Exploring the Moon through Binoculars and Small Telescopes" by Ernest H. Cherrington, Jr. will get anyone started in lunar observing. After a good section on lunar motion and phases, the meat of the book is found in a day-by-day guide to the moon's features, with emphasis naturally laid on those near the terminator.

Cherrington makes it easy to find these features by relating them to each other. For example, a common measure of distance is the apparent length of Mare Crisium. Thus we find that the crater Cleomedes is just north of that mare, and two Crisium lengths to the northwest is Endymion.

The text reminds me of a travel guide. "Figures dealing with size, age, depth are included on hundreds of features while not interrupting the flow of description. Many fine photographs are included, including a series or the entire Lunar disk in pairs - one with labels and one without.

This book is invaluable to anyone with an interest in our nearest neighbor. Even if you don't use binoculars, your time will be amply repaid.

On a larger scale, our library also has Patrick Moore's "Exploring the Night Sky with Binoculars" (hmm ..sounds familiar.) The main part: of this book consists of a list of the constellations with the objects found in each. Simple charts are located, though some of the constellation outlines are unusual. Moore particularly stresses double and variable stars, even devoting a chapter to them. An interesting feature is the comparison of the views given by different sizes of binoculars, something common with telescopes.

Other chapters give an overview of the moon, planets, and sun (though not recommended), and comets. Overall, this book should help the beginner start finding his way around the sky and gain a foothold he can build on.