

Quasars and the Evolution of Galaxies

From Compuserve Astronomy Forum

Quasars are nascent galaxies. They are at the earliest stages of the galactic evolutionary continuum which proceeds on through the 'active' to the 'normal' and finally the quiescent 'elliptical' states.

Due to their extreme density quasars display a large component of redshift attributable to their local gravitational potential in addition to the normal cosmological effect. Therefore, quasars do not reside at their apparent redshift distances. Quasars are exploding "black holes". The term black hole is used guardedly here, since such phenomena have markedly different behavioural characteristics in the relativistic universe than they do in the standard model. Black holes in the relativistic universe may have event horizons but do not have singularities of zero volume and infinite density. Such singularities are mathematical entities without physical counterpart. This distinction is fundamental to the Relativistic Universe theory.

The Relativistic model assumes that the end result of gravitational collapse is a 'quantum soup' of finite mensuration, enclosed within an event horizon and comprised of the undifferentiated structural components, matter, energy, space and time. It seems reasonable to assume also that most such structures will possess a rotational velocity.

Such a black hole will be inherently unstable owing to quantum effects. Specifically, the relative quantities of the structural components are not fixed but will fluctuate. When the mass component drops below the quantity necessary to maintain the event horizon, the

horizon disappears, radiation bursts forth omnidirectionally, matter is ejected preferentially in the equatorial plane, the 'quantum soup' begins sorting itself out and a quasar or young galaxy is born.

Several interesting results can be expected from such a scenario. First, a brand new quasar will exhibit, to distant observers, a very high degree of gravitational redshifting, but for a maturing quasar this effect will gradually diminish as it evolves a more galaxy-like structure. In this regard it should be remembered that events unfolding rapidly in the immediate vicinity of a quasars surface will appear to be proceeding much more slowly to a distant observer.

We should expect the youngest quasars with the highest intrinsic redshifts to represent a relatively small proportion of the overall quasar population since the radial distance at which they remain visible will be less than that of lower redshift quasars. Similarly, the reduced time dilation effect of the diminished gravitational fields for the lowest redshift quasars should result in their evolving quickly into the active galaxy phase. Their overall population numbers should also be small.

Additionally, matter ejected from the quasar can be expected to retain its interior rotational velocity. This arises from a straightforward consideration of the equation for angular momentum:

$$L = m v r$$

Since angular momentum must be conserved but under the quantum conditions holding forth mass (m) is not constant but is diminished, it is velocity (v) that remains stable as radius (r) increases.



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Important News For The Next Meeting!

Sky & Telescope has announced a change in its discount plan for astronomy clubs. As you probably know, for some time sky & Tel has required all members of a participating club to subscribe to the magazine as a condition of membership. This requirement has caused numerous discussions in our club, and I'm sure in others as well, as to whether the plan is worth it because some members prefer Astronomy to Sky & Telescope, or say they simply don't have time to read any magazine. Such discussions usually crop up about the time Sky & Tel raises its price, which in turn forces PAC to raise its membership dues.

Effective July 1, Sky & Tel is increasing its subscription price to PAC members from the present \$18 to \$20. If we continue to include a subscription as a privilege of membership, we would be forced to raise dues to \$28 for regular members (from the present \$26) and

\$31 for families (increased from the present \$29), just to maintain our margin (which is too slim as it is—see figures below.)

However, effective July 1, Sky & Tel is no longer requiring all club members to take the magazine, as long as at least five members participate in the discount plan. It is doubtful that this reduced requirement would be a problem, because most amateur astronomers continue to regard Sky & Telescope as essential reading. At the June meeting, we will be discussing the following questions:

1. Do we, effective July 1, wish to eliminate Sky & Tel as a "required" privilege of club membership?
2. As an alternative, do we want to give members a choice between Sky & Telescope and Astronomy as a "required" privilege with the present, or an increased

The Prairie Astronomer

c/o The Prairie Astronomy Club, Inc.

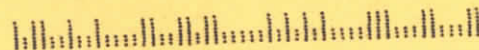
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Next Meeting June 30, 1992



dues structure (i.e., you have to take one or the other), or...

3. Do we want to offer no magazine as a part of the dues structure, but offer Sky & Telescope as we presently do Astronomy—as an option at special club rates over and above the dues? (Astronomy's present price through the club is \$16, which we can expect to increase; Sky & Tel's is \$18 for any renewals before June 30, \$20 thereafter.)

4. If we adopt alternative #3, we'll need to establish a new membership dues structure that reflects the absence of a magazine subscription.

For purposes of discussion regarding (4), here is how the present dues structure is (theoretically) allocated to expenses:

Sky & Telescope	\$18.00
Astronomical League	1.90
Newsletter Postage	3.48*
Newsletter Printing, etc.	4.80*
Miscellaneous Other Expenses	1.83
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Total Annual Expenses per Member	\$30.01

The Prairie Astronomer is published monthly by the Prairie Astronomy Club, Inc., and is free to all club members. Membership status and expiration date are listed on the mailing label. Membership dues are: Junior Members and Newsletter Only Subscribers...\$10/yr; Regular Members...\$26/yr; Family Memberships...\$29/yr; Address all new memberships, renewals, or questions to THE PRAIRIE ASTRONOMY CLUB, INC., P.O. BOX 80553, LINCOLN, NE 68501. For other club information contact one of the following officers: Dave Knisely (Pres)223-3968, Eric Hubl (V.Pres)423-6267, Ron Veys (Sec)486-1449, Lee Thomas(Tres)483-5639, Jack Dunn (2nd V. Pres)475-3013. All newsletter comments and articles should be sent to Newsletter Editor JOHN LORTZ, 12023 PARKER PLZ #105, OMAHA, NE 68154 no later than 10 days before monthly club meetings. Club meetings are held the last Tuesday of each month at Hyde Observatory in Lincoln, NE.

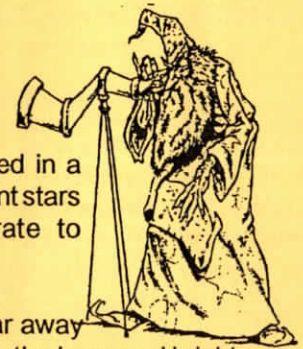
* Estimates, based on 12 mailings per year at .29 each and 2 double-sided Xeroxed 14-inch pages @ .20 each 12 times a year, which is assumed to include "overhead" costs of additional preparation materials, computer amortization, etc. These expenses are presently being borne by John Lortz, so this money ends up in the treasury, which always makes our year-end P&L look like we're raking in the loot.

If we wanted to set dues at a theoretical breakeven point, based on the assumption that the club was picking up newsletter publication expenses (or might be required to at any time), we could simply back \$18 out of the above calculation and charge \$12.00 for regular members and \$14.00 for families. Because the regular membership price would then be so close to our present Junior member price (\$10), we could abolish the class of membership altogether and convert Junior memberships to regular memberships at the next renewal date. Ditto with so-called "Newsletter" subscriptions (\$10).

Come prepared to discuss this possible change so we can make any adjustments effective July 1. Also, please note: Regardless of your

Observing Chairman's Report

by Dave Knisely



THE NEXT SCHEDULED STAR PARTIES WILL BE HELD JULY 3rd, 24th, AND 31st AT THE ATLAS SITE. Start your mid-summer observing with the small planetary nebula NGC 6210, located 3.5 degrees east and 2.3 degrees north of Beta Herculis. Small telescopes will make it look like a fuzzy 10th magnitude star, while a six inch will show its tiny bluish disk. Larger instruments at high power will show the central star burried in nebulosity, and will give the object a greenish-blue cast.

Up north in Draco is the intersting edge-on spiral galaxy NGC 6503. It can be found in a rather blank region about 1.2 degrees south and 2.6 west of Phi Draconis. It is difficult in a four inch, appearing as a faint fuzzy streak. A ten inch shows the galaxy well, revealing the brighter center and nuclear bulge. On a good night, some mottling can be seen on the face of this object.

Moving way down south into the southern reaches of Scorpius, we find the bright open star cluster NGC 6231. It is visible in binoculars about a degree north of Xi Scorpii, and is tough to see for people north of 40 degrees latitude. Small telescopes will show about 15 fairly bright component stars in a form that is slightly elongated east to west. Larger instruments will reveal at least another 20 fainter stars mixed in, making it rich and beautiful.

Farther east is the beautiful open star cluster M6. Located about five degrees north and one east of Lambda, this group is an easy binocular object, appearing as a grainy fuzzy spot. Small telescope users will have no trouble resolving M6, with a six inch showing crossing curves and chains of stars. The stars seem to outline the shape of a butterfly, which gives the cluster its

name. It is located in a rich field of very faint stars visible in moderate to large apertures.

Not too far away to the south east is the large and bright cluster M7. It is visible to the unaided eye as a fuzzy spot about four degrees east and 2.5 north of Upsilon Scorpii. Binoculars will resolve the cluster, with small telescopes revealing 15 to 20 bright stars. Large instruments add some color to the brighter stars, and help bring out the rich background of faint stars.

There still remain a few interesting globular star clusters in this area, and even though they are visible in small telescopes, none are very spectacular. M9 is a small faint fuzzy ball about 2.75 degrees south and 2.25 degrees east of Eta Ophiuchi. An eight inch is required to begin resolving the cluster, and a ten inch reveals many stars, but M9 is not terribly spectacular. M14 is a similar group which lies 2.75 degrees east and 1.8 north of 47 Ophiuchi. A six inch won't show much more than a grainy fuzz ball, while an eight will show some stars in the outer regions. A ten inch at 230x will show several hundred component stars, but the cluster is still largely unresolved.

M80 is a bit worse, although it is fairly easy to find. It is 1.8 degrees west of 1/3rd degree north of Rho Scorpii, and is just a faint fuzzy ball in a 2.4 inch refractor. A six inch reveals a small bright core and only a few component stars in the outer haze. An eight inch does better, while a ten reveals many hundreds of faint stars surrounding a fuzzy unresolved core.

the Moon's disk west actually is toward east in the sky — it's the only celestial body besides Earth that uses this oddball convention.)

U.S.-RUSSIA PACTS

On Thursday the 18th, NASA administrator Daniel Goldin signed a contract with his Russian counterpart Yuri Koptev. Under the terms of this first- ever agreement, the Russian aerospace firm NPO-Energia will conduct a one-year feasibility study of three potential technologies: using a Soyuz capsule as a kind of lifeboat for Space Station Freedom; adapting an exist- ing Russian docking system for more universal use; and perhaps using the Mir space station for conducting some of NASA's life-sciences experiments. The signing coincided with the U.S. visit of Russian president Boris Yeltsin. He and President Bush have also agreed that an American astronaut will soon fly aboard Mir and a cosmonaut aboard the Space Shuttle.

COSMIC WINDFALL

The Alfred P. Sloan Foundation has made a gift of roughly \$8 million that astronomers will use for creating a new map of the universe with unprecedented detail. The 10-year project is expected to log a million galaxies, 100,000 quasars, and numerous intergalactic clouds by the time it's completed. The effort will utilize a new 2.5-meter telescope to be built in New Mexico. ■

A Short History of the Atlas

From Compuserve's Space Forum

The first ICBM deployed by the United States, Atlas became operational in its "D" variant with the Strategic Air Command in September 1959. In January 1952, the MLC (Military Liaison Committee, the committee that gave military requirements of nuclear weapons

to the Atomic Energy Commission) asked the DMA (Division of Military Application, the branch of the US Army responsible for all nuclear weapons development) to make a study of the nuclear warhead for missile project MX-774 later named Atlas.

The original warhead conceived would have weighed 9,000 pounds and this requirement generated the design of a giant launch vehicle of some 200 tons, over 90 feet in length with seven first stage engines each generating 125,000 pounds thrust. This warhead design was soon replaced with a predicted one megaton device that could fit into a 3,500 pound re-entry vehicle.

The "Castle" series of nuclear tests in early 1954, confirmed the possibility of lighter weight warheads and because of this, the Atlas design began to assume its familiar size and shape (see Atlas A below). Early versions of the combat missile had a range of 5,000 miles, carrying a 6,000 pound warhead, while later variants increased this to 8,000 miles. All Atlas ICBMs carried a single nuclear warhead in various re-entry vehicles. At one time, 159 Atlas ICBMs were on duty.

During its military career, Atlas was based at the following locations: *Atlas D*: Vandenberg AFB, California, Offutt AFB, Nebraska, Warren AFB, Wyoming; *Atlas E*: Fairchild AFB, Washington, Forbes AFB, Kansas, Warren AFB, Wyoming, *Atlas F*: Schilling AFB, Kansas, Plattsburg AFB, New York, Lincoln AFB, Nebraska, Atlas AFB, Oklahoma, Dyess AFB, Texas Walker AFB, New Mexico.

Atlas was phased out of the Strategic Air Command in 1965 and it has since become a mainstay in the satellite launching field, it played a pivotal role in early US manned space flight and it has done much to allow the human race to better communicate with itself. Atlas has become one of the most utilized boosters in space exploration and in the surveillance of our own planet.

membership renewal date, Sky & Telescope says they'll give you a one-year extension of your subscription at the present \$18 price so long as we get it to them before July 1.

So, if you want to take advantage of this, be sure to get your check for \$18 to me well before the June 30 meeting— at least by Monday, June 29 (don't wait until the meeting—that's too late!). ■

President's Message

by Dave Knisely

We have a lot to talk about at the upcoming club meeting June 30th. Those of us attending the Mid-States regional convention in Kansas City will probably have some interesting information to relate on how their convention went, along with some ideas for our convention next year.

We also have a potential membership structure change to discuss (see page 1) which should give our members more flexibility when it comes to dues and publication subscriptions. Be sure and attend if you can.

In other news, the last star party was a real record breaker, with around 20 to 30 people and eight telescopes in attendance. I came in late and almost couldn't find a place to park, but a moving

red light guided me to a spot on the northwest side of the main pad. It was a record breaker in another way, as the largest scope in the club ever to make a star party at the site was on hand to give spectacular views of deep-sky wonders. Tom Miller proudly displayed his Obsession 20" Dobsonian, which gave those who looked in some awe inspiring views of M51, M17, M11, and many other objects.

One particular sight I enjoyed was seeing, for the first time, COLOR in the stars of several bright globular clusters! Several red giants were visible in M5, while other yellow and bluish stars also made their appearance. The 20 inch has a unique design which makes it a lot easier to set up and move around the sky than most large Dobsonians. It is still a little awkward to use on objects which were nearly overhead, but Tom provided an unusual step ladder which allowed two people to be on it at a time, and that helped. We also used it as a searchlight, sending flashlight beams thousands of feet into the night sky. See what you miss by not coming out?

I am glad to see so many people taking advantage of the site and the opportunity to get together and observe. You don't even need a telescope. So come on out in July, because there are three star parties that month! See you at the meeting. ■

New Light on an Old Mirror

by Earl Moser

In the mid-60's the Prairie Astronomy Club Considered buying a telescope for use of club members who didn't have one of their own.

While visiting relatives in Twin-Falls, Idaho, in 1967, I ran across a 12 1/2" f6 telescope that fit all the specifications that the club had issued. The telescope was in the back yard of a jewelry store in Twin-Falls. The owner was an avid amateur astronomer and also had a planetarium on the 2nd floor and a new domed observatory on the roof of the jewelry store. I don't remember the jeweler's name, but he told me that the school kids in the Twin-Falls area made regular visits to his planetarium and observatory.

The 12 1/2" scope on the back lot was no longer needed and was for sale. I took pictures of the telescope and showed them at the next meeting. Within a few months the telescope was shipped to Lincoln and after a year or two was moved out to my place where it is today.

Now here's the climax of the whole story. *The jeweler told me that the*

telescope mirror was made by John Mellish!! I told him that I never heard of Mellish, but he said that the name of Mellish was as well known in relation to reflecting telescopes as the name Alvan Clark was to refractors!

I shrugged it off and after relating the name to club members with little or no response, I forgot the name Mellish until I read the July 1992 Sky and Telescope. On page 23 there is a story about Barnard and Mellish seeing craters on Mars. Now that the name Mellish is for real, there may be a renewed interest in our club telescope. I would like to hear some comments from you! ■

Sky & Tel News

From Compuserves Astronomy

June 5, 1992

NOTES ON THE PROGRESS OF SOLAR CYCLE TWENTY-TWO:

The average monthly sunspot number for May is the lowest in four years (May, 1988). The smoothed monthly-mean American Relative Sunspot Number for November, 1991 continued to decline, dropping to a value of 134.4. Note the large number of short-lived, undeveloped sunspot groups and small quantity of solar flares listed in the SUNSPOT-GROUP SUMMARY, and the number of low-intensity ionospheric disturbances in this month's table of SID events; situations which reflect the current lack of solar activity.

Cycle twenty-two began September 1986 with a smoothed mean (Ra) of 10.0, and reached maximum with the July 1989 smoothed mean (Ra = 163.2). The end of solar cycle twenty-two and

onset of cycle twenty-three is expected to occur circa 1996-97.

According to Space Environment Laboratory, statistical models based upon historical cycle patterns suggest that activity will stabilize at the decreased level experienced recently, and then decline to an even lower plateau several months from now. However, some periods of relatively enhanced activity are likely to occur as this cycle wanes.

JUNE NOTES:

Preliminary data for the first twenty days of June indicate that flare and spot activity have remained near the low levels experienced since March. Just two class M flares have been recorded thus far during June; neither was a major event.

June 12, 1992

YET MORE PLANETS?

This past week has made for big news from the world of professional astronomers. One reason is that thousands of them met in Columbus, Ohio, to discuss the latest research findings. Two scientists from JPL, for example, presented their evidence that eight stars some 450 light-years away in the direction of Taurus and Auriga are encircled by planets or other smallish bodies. They based their claim on an analysis of data from the Infrared Astronomical Satellite acquired in 1984. The eight young stars all show gaps in the envelope of gas and dust blowing outward from their surfaces, as if planets had swept up material in the surrounding disk.

GASPRAS LOOKS GREAT!

On Thursday, NASA also released the highest-quality image taken by Galileo of the asteroid 951 Gaspra. The spacecraft camera recorded details on the 12-mile-long object no bigger than 200 feet across. Gaspra is peppered with more than 600 small craters. But actually, if this minor planet were truly ancient there should

be lots more. Consequently, space geologists estimate that Gaspra is really a fragment that splintered off a larger object some 200 million years ago. Gaspra also exhibits faint sets of grooves, much as the Martian moon Phobos does, which apparently formed when it collided with good-size chunks of interplanetary debris. Galileo actually went past this minor planet last October 29th. But due to antenna problems the spacecraft had to store these images on a tape recorder and wait until now to slowly play them back to Earth.

POSSIBLE HIGH-LATITUDE AURORAS

Solar activity has been mixed in recent days. There are no naked-eye sunspots, and in fact the sunspot index has been running from 50 to 70. But an aurora watch for the weekend has been issued for those of you living in the northern U.S. and in Canada.

June 19, 1992

VENUS' DISAPPEARING ACT

Venus went through superior conjunction a week ago, on the 13th. Were it not for the Sun's brilliance, we could have seen Venus actually pass behind the solar disk on that date. This conjunction has temporarily brought to a halt the mapping of Venus by Magellan. It will resume sending its radar scans to Earth about the 26th.

LUNAR LIBRATION

The lunar eclipse of the 14th has come and gone, an event that was widely observed throughout the U.S. thanks to considerable help from the news media. Here's another lunar event of note. On the morning of the 24th, one day after reaching last quarter, the lunar disk will be librating quite a bit. Early risers might just get a glimpse of the enigmatic far-side basin called Orientale, which usually is just out of view over the Moon's southwest limb past the dark crater Grimaldi. (Don't forget that on