



# THE *Prairie Astronomer*

## EXPLORING A UNIVERSE

by Rick Johnson

NGC 2362. The bright star Tau is near the center of a small group of 20 to 30 faint stars all clustered around it like fireflies around a yard light. It is a good object even for small to moderate sized instruments.

For you galaxy lovers, try and find NGC 2403, a bright spiral p73 located out in the middle of nowhere about a degree west of the faint star 51 Camelopardalis. It is visible in binoculars as a small faint fuzzy patch, with an eight inch revealing hints of vague diffuse light and dark detail. A ten inch on a good night may reveal one spiral arm and a dark spot to one side of the nucleus.

As a final target, look two degrees west and one south of 6 Puppis for the small two-shell planetary nebula NGC 2440. An eight inch makes the outer shell look a bit elliptical and diffuse at the edges, with the inner one being bright and roughly circular. The nebula has a bluish-green cast and has a very faint central star, visible in large apertures.

I am now free to explore a universe at more than one trillion power and see things no one else has ever seen! Now before you have me committed, let me explain. The story starts more than 35 years ago.

As a youngster I discovered telescopes and microscopes at about the same time. By the time I was 9 I had a 6" f/12 reflector that was too big for me to use and a Gilbert microscope. Both would go to about 300 power. Like most power hungry kids I needed more power to explore the two universes opened by these instruments. Every time I came up with a new way to get more power out of the telescope or microscope my dad would ruin my expectations by saying my idea wouldn't work so he wouldn't help me try.

I can remember thinking I could "double" the power of the telescope by putting the 300 power microscope behind the 300 power eyepiece. I knew the weight would be a problem but surely dad could solve that problem. Of course he explained that the power would be more than doubled and that it wouldn't work anyway. All I heard was "MORE THAN DOUBLED" causing my excitement to also more than double as well as my frustration at his insisting it wouldn't help anything anyway.

Soon I came up with an even better "solution." All I had to do was borrow his camera and take a picture through either the telescope or microscope and then put the photo under the microscope! This would work with both and surely he couldn't object to this one. Again I can remember going to bed with tears and screaming at him that "IT WOULD TOO WORK!" Dreams die hard at that age.

Whether I was using the telescope or the microscope both involved the exploration of a universe. True one was a very big universe and the other a very small one but they were universes just the same. Both offered the lure of the unknown and helped satisfy the urge to explore and at least pretend you were; "Going where no man has gone before." Unfortunately, I was still hemmed in by the laws of our physical universe. Still there was so much to explore a lifetime wouldn't do it. But I was still bothered by the restrictions the universe put on me. It was telling me I could see some secrets but there was a limit to where I could explore.

Until recently I never did achieve the goal of my youth to explore a



**The Prairie Astronomer**

c/o The Prairie Astronomy Club, Inc.

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Lincoln, NE 68501

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**Next Meeting January 29, 1991**



universe with no restrictions. The laws no longer stand in my way. I can explore anyplace in a universe at any power -- I have actually used magnifications far greater than a million trillion power! The view was crystal clear and I didn't need any help from Ron Veys' glasses. Now don't call out the men in the white coats just yet!

As you probably suspect there is a catch. I am not talking about the astronomical universe or the microscopic one. The rules of these universes still stand in my way. I am speaking of yet another universe. One that a few weeks ago I had only vaguely understood. This universe exists in a rather obtuse mathematical iterative equation that reads  $Z = Z \times Z + C$ . I'll only mention that C is a complex number involving a real and imaginary part and that Z starts out equal to C for the first iteration.

The microscopic universe needed a microscope to see. The astronomical one needed a telescope and this mathematical one needs a computer. Such a mathematical universe knows no physical bounds like the others I have explored. Here the computer is the telescope or microscope and it isn't bound by unifying natural laws. The entire universe generated by this formula exists on a round piece of graph paper in which the center is 0,0. The page runs two units in all directions. The vertical axis represents the imaginary part of C and the horizontal axis the real value. Rather than using paper I use the computer to draw this universe out. In this case the computer is more like a microscope allowing me to look more and more closely at this finite sized universe containing an infinite amount of detail.

Some theories of our astronomical universe have it similarly finite and yet infinite at the same time. Thanks to the explorations I have been making of the mathematical universe I am almost beginning to understand this oxymoronic concept.

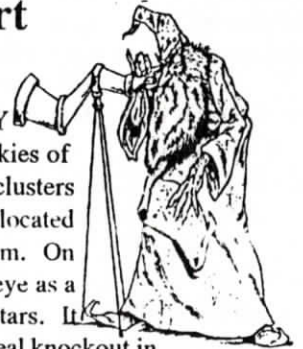
A computer screen has a limit of resolution called a pixel. This is somewhat like the airy disk in a telescope. No magnifying glass will help show more detail than is in this disk. But with the computer I can magnify the universe so that the area that was displayed by one pixel is now the size of an entire screen. Thus, I can now see the detail hidden by that one pixel in the original view. If I want I can now enlarge the area of one of these pixels to fill the entire screen yet again and again and again etc. There is no real limit to how many times I do this. True as I do this the number of decimal places needed to calculate the detail rises rather rapidly. Still I can explore this universe on a scale that is equivalent of looking at the astronomical universe at

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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 (Treas)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 7 days before monthly club meetings. Club meetings are held the last Tuesday

## Observing Chairman's Report

by Dave Knisely



STAR PARTIES WILL BE HELD ON FEBRUARY 8TH AND 15TH AT THE ATLAS SITE. The cold skies of February offer a large number of interesting open star clusters for the dedicated observer. One of the brightest is M35, located one degree north and 1.25 degrees east of I Geminorum. On a good night, this object is just visible to the unaided eye as a tiny fuzzy spot, with binoculars showing a few of its stars. It is very pretty at low power in a 60mm refractor and a real knockout in anything over four inches. Two arcs of bright stars add to the beauty of this object, although the center is a bit sparse. Those of you with moderate apertures should be able to see a small fuzzy spot just off the south-west side of M35. This is NGC 2158, a rich but very distant open cluster which is difficult to resolve. A six inch at 120x will show many of the component stars, but a larger aperture is usually needed to resolve it well. A ten inch shows it as a very tight but rich triangular shaped group of faint stars.

Also in Gemini is the famous ``Eskimo Nebula'', NGC 2392, located 1.5 degrees east and a half north of the star 56 Geminorum. This moderate sized planetary nebula appears as a faint fuzzy star in small telescopes, with larger ones revealing a faint two shell structure. A six inch will reveal the central star in the inner haze, while a twelve inch equipped with a nebular filter will show detail in the inner shell and make the outer one look patchy.

There is a challenging open star cluster, NGC 2304, about three degrees east and a half north of 28 Geminorum. It is marginal in a six inch, with an eight inch showing it as a moderate sized fuzzy ball of very very faint stars in a cluster, and this may confuse observers as to which group is really the cluster.

In Eastern Orion is a bright open cluster, NGC 2169, located one degree south and one third east of Nu Orionis. It is a fairly small group of fairly bright stars in two adjacent triangles. An eight inch reveals about 20 members with many bright blue in color. Some distance to the east in Monoceros is the famous Rosette Nebula, NGC 2244, located about two degrees east and a bit north of Epsilon. On a good dark night, a pair of 10x50 binoculars will show it as a small oval cluster of stars surrounded by a faint circular haze. Larger telescopes won't show much of the nebula unless very low power is used. This object is strongly helped by the use of a nebular filter, particularly, the Lumicon OIII or the Orion Ultrablock filter. Using a filter, the nebula becomes rich in detail, including several dark spots. Also in Monoceros is the large open cluster, NGC 2264, located near and south-east of S Monocerotis. It is an irregular group of about 20 fairly bright stars with S Monocerotis at the north end. An eight inch will sometimes show a faint reflection nebula around S, while very large telescopes on excellent nights may show the dark inclusion half a degree south of S known as the ``Cone Nebula''.

In southern Canis Major is the pretty ``TAU CANIS MAJORIS'' cluster,

lighting, and faint unresolved stars. It allows the light from the nebula to come through almost undiminished, but does dim the stars in the field a bit, not altogether a bad thing, since stars sometimes drown out faint nebulosity. The unit I tested showed a full width at half maximum of about 230 Angstroms, with the transmission being above 87 percent from H-beta to the second Oxygen III line at 5006.8 Angstroms. This is sufficient to enhance the appearance of most emission nebulae without dimming them significantly. The Ultrablock filter seems to resemble the design of the Lumicon UHC filter, thus I tested it in my 10" f/5.6 Newtonian directly against the UHC on a number of nebulae both in town and in a dark site setting.

The Ultrablock screws on the front of the eyepiece being used with the same ``standard'' thread that Lumicon uses and comes in a standard camera filter plastic case. It works best at low to moderate powers, since high magnification reduces the light density. In town, it provided quite a nice view of the Orion nebula, and gave a somewhat higher contrast picture than did the Lumicon UHC filter (both gave me much better views than without a filter). The Ultrablock also seemed to dim the stars slightly more than the UHC did. Outside of town, they were nearly equal, with a very slight edge to the Ultrablock. Both enhanced the Rosette, with the Ultrablock again yielding slightly higher contrast. Using no optical aid, holding the filters up to the eye, the Rosette was easily seen naked eye as a small puff in the sky. Viewing the Veil, the Ultrablock and UHC both performed well, with little difference in performance. On the North American nebula, the Ultrablock gave a very slight improvement in contrast performance over the UHC. On planetary nebulae, both filters performed well, helping significantly over no filter at all. Ultrablock and UHC gave a nearly equally enhanced view of the Dumbbell and Ring nebulae, both in and outside town. On the Owl nebula, the Ultrablock gave a somewhat better view than did the UHC with both ``eyes'' being clearly visible at 110x. Both filters dimmed reflection nebulae such as the Merope nebula in the Pleiades, although they did darken the sky background.

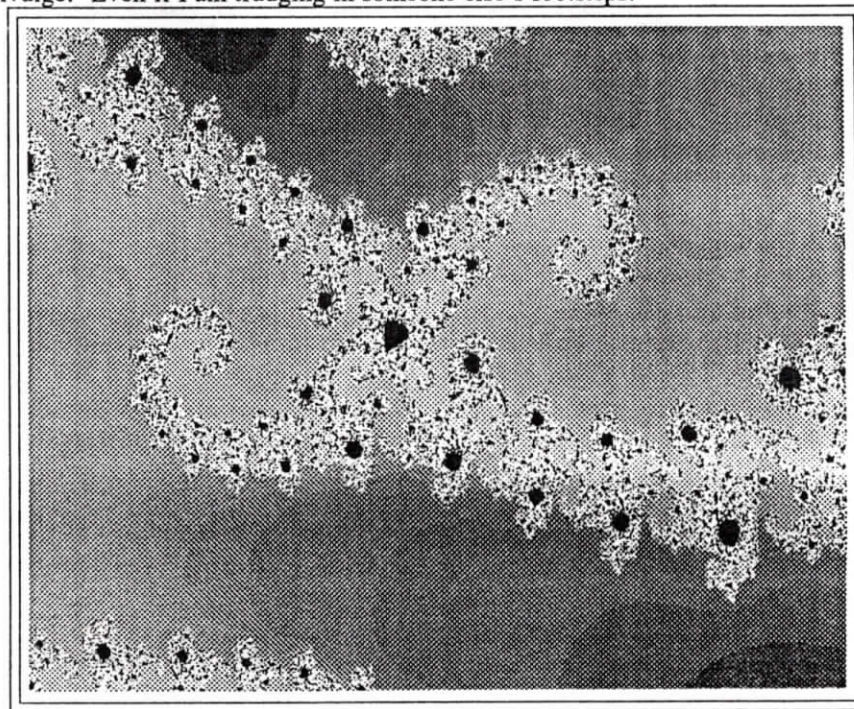
On reflection nebulae, I still prefer the Lumicon Deep-Sky filter, since it is much more broad-banded than either the UHC or the Ultrablock filters. The only other filter I compared the Ultrablock to was Lumicon's OIII filter, and on the Rosette, the Veil, and the North American nebulae, the OIII performed somewhat better than the Ultrablock. Again, Orion's filter is similar to the UHC, thus comparing it to the OIII isn't really fair.

In conclusion, the Orion Ultrablock filter is an effective nebula enhancing unit, with performance characteristics similar to the UHC. It is a slightly better light pollution filter for in-town viewing than the UHC and it costs \$20 less than the UHC, making it a better bargain for the cost conscious amateur.

the subatomic level. In fact I have already examined a very minute part of this universe at a scale that would have one pixel in the original screen enlarged to where it was more than 10 billion times larger than the known astronomical universe! I can go much much farther than this into the universe. In fact the program I am currently using, Fractal Explorer 2.0, can display more different views of this mathematical universe than there are electrons in the astronomical universe! I am truly seeing things no one has ever seen before. If I don't save the image or its location it is far more likely that I'll be hit by a falling meteorite than anyone will ever see that sight again.

There are many programs available that allow a computer to explore these mathematical universes, some commercial, others public domain. However, like in astronomy it isn't quite as simple as I have painted it. You do need a fast computer for the higher magnifications. This is because the numbers being manipulated can be more than 70 digits long and more than a billion calculations may be needed to draw one screen. You also need a large hard disk if you plan to save an image. One image can take up to 1.6 megabytes of disk storage in the highest resolutions. Even a standard VGA image takes nearly 600k of storage per image. This is a big universe you are exploring!

In effect I have achieved my childhood goal of unhindered exploration of a universe. At least on cloudy nights. Clear, moonless nights will still see me out at the telescope exploring what few secrets the astronomical universe will divulge. Even if I am trudging in someone else's footsteps.



## President's Message

by *Dave Knisely*

As we enter 1991, we must begin to plan our activities for this year. First, there is the proposed trip down to the Kansas Cosmosphere and Space Center, tentatively scheduled for late February or early March, unless we decide to put it off until the fall. We need to set a date at the January meeting, so please attend or contact Jack Dunn at the Planetarium for more details. [See Jack's article elsewhere in the newsletter... ED.]

The next event on your calendar should be Astronomy Day. The Saturday in April closest to the first quarter moon turns out to be April 20th, and unless there is any objection, that will probably be the day for this year. We had a nice display last year, and I hope that with additional publicity, we will top it, both in quality and attendance. It will probably be held in the lobby of Mueller Planetarium, unless a better location presents itself. I am also looking for someone to take charge of organizing the display for this year. Jack Dunn and I have done it for the last two events, and I think it may be time for some new blood to take over. It isn't a terribly difficult job, with most of it amounting to a few phone calls and some advance planning. If you are at all interested in being Astronomy Day Chairman, contact one of the club officers.

Unless you were off the planet for a while, you probably know that there is an eclipse of the sun on Thursday, July 11th, starting around 1:00pm CDT and ending around 3:00pm CDT. Here in Nebraska, it will be only partial, but we may need to plan on manning Hyde Observatory for the general public, since its telescopes are not designed for solar work (with one notable exception).

Our next big event will be the annual ``regional'' Prairie Astronomy Club Picnic and Star Party. This year, it will be held on August 10th, near the peak of the Perseid Meteor shower. Last year's picnic was a bit sparsely attended, but the star party was excellent, despite a threatening light show from a few distant thunderstorms.

Make sure you mark your calendars now for a year of fun activities courtesy of your favorite Astronomy Club!

### Editor's Note:

Rick Johnson had a great suggestion for a new column in the Prairie Astronomer, and this month I'm going to introduce it. The column will be called ``Astronomy Q&A'' and the idea behind it is for you to send me your astronomical questions and I will forward those questions to one of the club ``experts' for an answer.

As Rick mentioned to me, there may be many newer members (or maybe even older ones!) that are confused about various things but are too shy or intimidated to ask questions. The column will allow them to send in their questions and receive answers anonymously.

So, please feel free to send your questions for next month's newsletter. My address is:

John Lortz  
12023 Parker Plz. #105  
Omaha, NE 68154

## An Important Note From Lee...

As expected, I'm receiving membership renewals at the old dues rates. A reminder: MEMBERSHIP DUES INCREASED AS OF JANUARY 1, 1991.

The new rates are:

Regular Membership .....\$26.00  
Family Membership .....\$29.00

Occasionally someone asks about a ``Newsletter-Only'' membership. There is no such thing. You can subscribe to the club newsletter for \$10.00 a year. That's all it is, however--just a subscription (no slight intended to Our Editor: Obviously, such a subscription would be an exceptional value at twice the price!)

Newsletter subscribers receive no club benefits. They cannot vote in elections, and they cannot obtain Atlas Site keys.

Please use the above rates for membership renewals. It slows everything to a crawl sending back checks, writing explanatory letters, etc. Thanks.

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## The Reviewer

by *Dave Knisely*

ORION 1.24" ULTRABLOCK LIGHT POLLUTION FILTER  
\$79.50

Available from Orion Telescope Center

Many of you have considered purchasing a nebular or light pollution filter, but have been uncertain which is best for which application. They do help in showing faint nebulae from both urban and rural locations, and they make objects once considered difficult fairly easy to observe. Lumicon has produced a series of nebular filters for nearly a decade which have led the industry in terms of performance. Now Orion Telescope Center is marketing its own series of filters, and has produced the Ultrablock filter for nebulae at a somewhat lower price than Lumicon's filters.

The filter is a multi-layer dielectric film-on-glass unit which relies on the interference of light waves to achieve a narrow passband centered between the Oxygen III and Hydrogen Beta emission lines found in most emission nebulae. This bandpass blocks out light pollution from Mercury and low pressure Sodium vapor lighting, plus natural airglow, while at the same time reducing the light pollution effects of continuous sources such as incandescent lighting, high pressure Sodium

# PAC

## KANSAS COSMOSPHERE TRIP

by Jack Dunn, Mueller Planetarium

Beginning January 15, 1991 the OMNIMAX Theater of the Kansas Cosmosphere will be showing "The Blue Planet" - the newest OMNIMAX feature filmed in space by the astronauts aboard several Space Shuttle flights. I would suggest that the Prairie Astronomy Club might like to take a trip down to Hutchinson to view the film and take in the exhibits of the Cosmosphere. Although the dead of winter might not seem the best time to be traveling, if we set up a weekend with alternative weather dates I think this might be to our advantage. It might be less crowded this time of year and perhaps accomodations would be easier to acquire.

For a motel, I recommend the Comfort Inn. I have taken several groups there in the past and it always seemed nice. Through the Cosmosphere I have obtained a rate of \$27 per double room per night (excluding tax). The rooms come with queen-sized beds and cable tv. Depending on the number going our rate may vary - but not that much. This has always seemed quite reasonable. Best schedule in the past has been to drive down on Saturday, see a show and tour, eat & relax, then see another show Sunday before we drive back.

Along with seeing a film or two and touring the Cosmosphere's exhibits. I could attempt to set up a workshop and possible tour of "Spaceworks" (the only full-time company in the world devoted to the restoration and building of replicas of space artifacts). The Cosmosphere and Spaceworks are quite unique facilities. It has been a number of years since the PAC took a trip to the Cosmosphere and I feel that the time is ripe. Later in the spring the weather might be nicer, but it might be more difficult to get people together and to make reservations.

COSTS:	Admission to OMNIMAX:	\$4.50 Adults
	(per film)	\$3.25 Children
	COMBO TICKET (w/Plan)	\$6.00 A, \$4.75 C

Admission to Cosmosphere: FREE

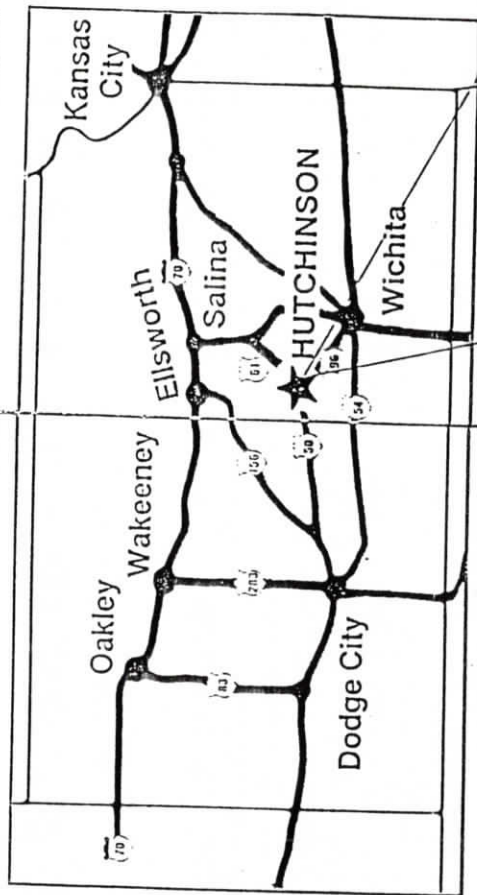
Motel: \$27 per room (plus tax)

Food: It's up to you  
(Hutchinson is not an expensive town)

On the next page is a map to Hutchinson and the Cosmosphere. I will have a sign-up sheet at the Dec. and Jan. meetings for those interested (Please indicated if you can drive). We can discuss suggested dates at the meeting. This notice will also be printed in the next PAC newsletter.

**HERE'S SOME COSMOSPHERE INFORMATION:**

**TRAVEL GUIDE**



MILEAGE INFORMATION TO HUTCHINSON, KANSAS  
AND  
THE KANSAS COSMOSPHERE AND SPACE CENTER

FROM	
ST. LOUIS, MO.	...506 MILES
KANSAS CITY, KS.	...210 MILES
LINCOLN, NEB.	...246 MILES
SALINA, KS.	...65 MILES
DENVER, CO.	...468 MILES
GOODLAND, KS.	...302 MILES
OKLAHOMA CITY, OK.	...210 MILES
WICHITA, KS.	...52 MILES

**SCHEDULES**

**HALL OF SPACE MUSEUM HOURS**

Monday through Wednesday	9:00 a.m.-4:00 p.m.
(Memorial Day to Labor Day)	9:00 a.m.-5:00 p.m.
Thursday and Friday	9:00 a.m.-9:00 p.m.
Saturday	10:00 a.m.-9:00 p.m.
Sunday	12:00 noon-8:00 p.m.

Free admission.

**OMNIMAX® SHOW TIMES**

SUN	MON	TUE	WED	THU	FRI	SAT
						11:00
						12:00
1:00	1:00	1:00	1:00	1:00	1:00	1:00
2:00	2:00	2:00	2:00	2:00	2:00	2:00
3:00	3:00**	3:00**	3:00**	3:00**	3:00**	3:00
4:00						4:00
6:00*						
7:00*				7:00	7:00	7:00
				8:00	8:00	8:00

\*Special Sunday shows when available  
\*\*Special feature — call for information

**Tickets**

Adults	.....	\$4.50
Sr. Citizens & Children 12 & under	.....	\$3.25
"Friends of the KCSC"	.....	\$3.25

**Reservations**

In order to accommodate our visitors, the KCSC recommends reservations for scheduled show times. Tickets must be picked up at least 15 minutes before show time or we reserve the right to sell them. Please telephone (316) 662-2305.

**PLANETARIUM PROGRAMS**

Saturday	1:00 p.m.	2:00 p.m.	3:00 p.m.	4:00 p.m.
Sunday		2:00 p.m.	3:00 p.m.	4:00 p.m.

Special summer show times during June, July and August  
1:00 p.m. and 2:00 p.m. daily

Tickets ..... all seats \$2.50

**SPECIAL SAVINGS**

"Combo" ticket admits one to both an OMNIMAX® film and a planetarium show.

Adults	.....	\$6.00
Sr. Citizens & Children 12 & under	.....	\$4.75
"Friends of the KCSC"	.....	\$4.75

**GIFT SHOP**

Space-related items and souvenirs are offered as well as educational materials such as books, slides, space patches, science experiment kits, models and telescopes. Hours are the same as Hall of Space Museum.

**FRIENDS OF THE KCSC**

Membership gives you special privileges while contributing to the dynamic work of the Cosmosphere. Benefits include discounts to OMNIMAX® film and planetarium shows, the "Cosmic Update" newsletter, and more. Contact the KCSC for more information.

**A SPECIAL NOTE**

The Kansas Cosmosphere and Space Center is a not-for-profit institution. This brochure, which costs 10 cents to produce, is designed to inform people about our many programs and activities. Please share it with another person when you no longer need it. Thank you.

1100 N. Plum, Hutchinson, KS 67501 • (316) 662-2305