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THE PRAIRIE ASTRONOMER

Volume 18, Number 7 June 27, 1978

STARS' X-RAYS 10,000 TIMES GREATER THAN SUN'S OUTPUT

A pair of stars far from earth is exchanging clouds of gas so hot they are radiating X-rays 10,000 times stronger than all the combined radiation pouring off the sun.

The stars are located in the constellation Ophiuchus adjoining Sagittarius in the northern skies and are so small and distant they are barely visible through even powerful telescopes.

So energetic are their X-rays, they stand out as the second or third brightest X-ray objects in the sky.

"They are generating temperatures we estimated to be about five million degrees," said Dr. Herbert Friedman of the Naval Research Laboratory, which together with the Harvard-Smithsonian Observatory, discovered the stars. "They are as bright in the X-ray region as the Crab Nebula, which is the second brightest (after Scorpius) X-ray object in the sky."

The stars were found by instruments aboard the High Energy Astronomical Observatory, which was put into earth orbit by the National Aeronautics and Space Administration 10 weeks ago.

"The stars grew in X-ray brightness until they were at the brightest at the end of 10 days," Friedman said. "We believe that we've seen a very bright X-ray nova, only the second one of its kind recorded."

The nova is a celestial object that suddenly and dramatically increases in brightness, usually because its outer sections explode.

Astronomers think an x-ray nova takes place when a super-dense star--called a neutron star--passes close enough to a normal star to draw in the normal star's gas and trigger a continuous explosion of gas.

Friedman said he believes the companion stars in Ophiuchus move around each other in a highly elliptical orbit, only triggering an explosion when they brush by one another.

JUNE MEETING NOTICE

The regular monthly meeting of the Prairie Astronomy Club will be held at Hyde Memorial Observatory on Tuesday evening, June 27, at 7:30 p.m. (The Steering Committee of Hyde Observatory will have its regular meeting at 6:30 p.m. the same night.)

Program Chairman Jack Dunn says the program will be "AS ATLANTIS, SO KRYPTON." Your imagination can run rampant with that title, because Jack offers no further details.

OBSERVING CHAIRMAN'S REPORT

Summer constellations begin to show themselves this month and with them come many interesting sights.

In Scorpio, be sure to look at M4, a globular cluster located about one degree west of Antares. It appears as a fuzzy blob of light through binoculars or small telescopes and can be resolved in a six- or eight-inch telescope to the extent of stars being visible practically to the center. At high power in my eight-inch, it almost looks like a dense open cluster.

Another globular in this area is M80, located 1-3/4 degrees west and ½ degree north of the double star Rho Scorpii. It is a good deal fainter and smaller than M4, being of the 7th magnitude. Those with large telescopes should look at Antares under high magnification for the faint close companion of Antares, a 7th magnitude bluish star about 3 seconds of arc away from the primary. Those with small telescopes should look at Beta Scorpii, a beautiful wide pair of blue-white stars of magnitudes 2.9 and 5.1 with a separation of 25 seconds of arc.

Moving northward to Ophiuchus, we find NGC I 4665, a large open cluster just about 1½ degrees northeast of Beta Ophiuchi. It is ideal for almost any telescope, and is somewhat elliptical in form.

In Hercules, you should try for NGC 6210, a small but interesting planetary nebula located 3 degrees east and about 2½ degrees north of Beta Herculis. It is very small and looks like a star under low power, so look carefully when trying to find it. It shows a bright inner ring and a faint outer ring under high magnification in a large telescope.

As a final sight for this month, look 3-1/3 degrees south and 2 degrees west of Iota Draconis for M102, a small elliptical galaxy that should be visible through a 4-inch telescope.

--David Knisely

TELESCOPE FOR SALE-------

8-INCH DYNAMAX, COMPLETE WITH TRIPOD AND 3 EYEPIECES. CALL TOM BEARDSLEY, 489-2450.

THE PRAIRIE ASTRONOMER is published monthly by the Prairie Astronomy Club, and is free to club members. Yearly subscription without club membership is $4.00. Regular membership (includes one-year subscription to Sky & Telescope, club newsletter, and four quarterly issues of the Astronomical League newsletter), is $12.00. Family membership (includes all regular privileges, plus one additional vote in club elections) is $14.00. Newsletter Editor, Lee Thomas (489-3855). Address all correspondence to PRAIRIE ASTRONOMY CLUB INC., P.O. Box 80553, Lincoln, Nebraska 68501.

HELPFUL HINTS ON EYEPIECE SELECTION (PART 4)

(Editor's note: This is the fourth in a series of articles on selecting the proper eyepiece for your telescope by club president Rick Johnson. See last month's issue for comparison chart to which the article refers.)

A couple of startling facts emerge from the information in the table in our May issue:

1) No eyepiece performs well at F ratios of less than f/5. This is the reason for my comment earlier that the 6-inch f/4 would have an inferior image to that of the 6-inch f/8 at the same 30 power.

2) No eyepiece designed performs well when its focal length is less than 8 mm. (Even very costly eyepieces start to lose contrast at focal lengths of less than 16 mm.

It is often said that a cassegrain gives better high power images than does a newtonian. Yet, optical theory says the large central obstruction of a cassegrain should result in lower contrast and thus poorer performance than the newtonian. The paradox is explained by statements one and two above. The eyepiece used in the cassegrain is performing at very high f ratios. High powers are achieved using long focal length eyepieces. As far as eyepiece theory is concerned this is the best possible situation. The newtonian requires half the focal length eyepieces or even less be used at f ratios at least twice as fast as the cassegrain. This is the worst of all possible situations for an eyepiece.

Since most of us are using newtonians, the obvious question is how can this eyepiece limitation be negated without undo cost. The answers I am going to suggest are rather radical and I am sure will create some controversy. They are backed by 24 years of struggling with this problem.

Two possible solutions present themselves: 1.) Design an eyepiece that does not suffer from these optical flaws and 2.)optically lengthen the focal length of the telescope until it is equal to that of a cassegrain. Let's examine each of the possibilities individually.

OPTICAL DESIGN

Why do eyepieces fail so miserably when they are made with short focal lengths? The reason is that, as observers, we are demanding too much of them. Optical theory, like most everything else in this world doesn't allow us to enjoy all possible benefits at one time but that's what we are expecting from our eyepieces--wide field, good color correction, high contrast and high resolution. Something has got to go,but what are you willing to sacrifice? Well, the newtonian, which most of us are using, suffers from one serious flaw--only the very center of its field of view is free of coma. Thus, only the very center of its field has theoret-

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EYEPIECE SELECTION (From Page 3)

ically perfect resolution and no eyepiece can take garbage and turn it into perfume. At low powers the coma is not noticable but it becomes very noticable at high powers. Thus, a high power eyepiece with a wide field of view is a pure luxury since only the center of this field of view can possibly be fully corrected.

Once you leave out the requirement that an eyepiece give a wide field of view at high power it then becomes possible to design one that will achieve all other goals. So, where do you get such an eyepiece? Well, it's not easy since no eyepiece manufacturer has been willing to take the risk in marketing such an eyepiece, but they do exist. What I am referring to is the wide angle lens from an old regular 8mm movie camera. With the advent of super 8 and zoom lenses such lenses are hard to find. By shopping garage sales and surplus stores and camera stores you can usually turn one up in a short time. Make seems to have little to do with quality and often they can be purchased for under $10. You will need to find someone with a lathe and threading attachments to make you an adapter for your new eyepiece. Any lens with a focal length of 5-8mm is what you are looking for. If the f ratio of the lense when wide open is less than 2.8 you should buy it. Higher f ratios have such restricted fields of view as to be too confining.

(Continued next month)

THE PRAIRIE ASTRONOMER
c/o The Prairie Astronomy Club
P.O. Box 80553
Lincoln, Nebraska 68501

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