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THE PRAIRIE ASTRONOMER

Volume 19, Number 5 April 24, 1979

PRESIDENT'S REPORT:

National Astronomy Day was Saturday, April 7, and, thanks to you, it was well-publicized in Lincoln. I'm really proud of the members of our club who helped man the display area in the Gateway Mall, who brought their own telescopes out to put on display, who entered and helped to run the Astrophotography contest, and who worked at the Observatory that night. About 60% of our club members were involved in Astronomy Day activities in one way or another.

If you got up early, you heard me talking to Judy Converse on KLMS radio about our club's activities and the Gateway showing. The main office out at Gateway estimated that over 3000 people walked through the mall that Saturday and saw our display of telescopes and photographs. We passed out about a thousand free sky calendars and the publicity must have paid off because Doc Manthey reports that a very good crowd showed up at the Observatory for public viewing that night.

The Astrophotography Contest turned out to be the biggest surprise. Including a whole raft of submissions that final week, we had 41 separate photos entered by 11 individuals--5 members of our club and 6 non-members. First prize went to Steve Myatt for a beautifully detailed picture of Saturn. Second prize was awarded to John Lortz for his mystical double-exposure titled "Midsummer's Eve." And third prize was won by Mark Novatny for a color photo of the "diamond ring" effect. Also, five Honorable Mention certificates were presented to Steve Myatt (2), Bradley Leseberg, Ron Veys, and Dave Knisely.

All of the contest entries are now on display at the Observatory for the next three weeks or so. We hope to make this an annual event. Next year's contest should be even bigger and better.

Once again, thanks to everyone involved.

-- RON VEYS

APRIL MEETING NOTICE

The April meeting of the Prairie Astronomy Club of Lincoln will be held at Hyde Observatory Tuesday night, April 24, at 7:30 p.m. Preceding this meeting, the Hyde Observatory Steering Committee will meet at 6:30 p.m.

This month's advanced program will be presented by Sekhar Chivukula. He will be discussing black holes. The "fundamentals" program will be "How to set up your telescope and find your way around the Sky" by Rick Johnson.

THE BARLOW LENS (PART 2)... BY LARRY STEPP

In the first part of this series on Barlow lenses I gave equations for calculating the magnification and spacing. I also described a couple ways a single Barlow lens can be used to get more than one magnification factor.

My own suggestion for this purpose is to make a simple extension tube to fit in the eyepiece end of the Barlow. Figure 3 is a diagram of the cross section of a Barlow lens and shows how an extension tube can be used to increase the magnification. The extension tube can be made using pieces of brass telescoping tubing such as Edmund sells, epoxied together, or using a chrome plated brass sink extension tube. In either case, the $1\frac{1}{4}$ inch diameter section should extend about an inch and a half below the larger section, and the inside should be painted flat black. The length of the larger section will determine the increase in magnification.

Let's use an example to illustrate this point. Suppose you have an f/8 reflector and you want to be able to use 50X per inch for those really clear nights that come a few times a year. Also, for the sake of image quality and eye relief you want to get this magnification using your 16mm orthoscopic eyepiece.

Now, to get 50X per inch with this eyepiece, the focal ratio of the telescope needs to be 50 times (16/25.4) equals f/31.5. This requires a magnification factor in the Barlow of 31.5/8 = 4. Suppose you have a commercial Barlow rated at 2X, in a tube 5 inches long. Remember that for a 2X Barlow, b = -f, that is, if b is about $4\frac{1}{2}$ inches judging by the tube length, then f = $-4\frac{1}{2}$ inches or about -114mm.

To use this lens to gain a magnification of 4, a = (f / m - f or a = 86mm. Then b = ma or b = 344mm which is 13.5 inches. Since b was originally about 4.5 inches, an extension tube 9 inches long is needed. Notice however, that a has also changed, from 57mm to 86mm. This means that the Barlow tube has to be focused about 30mm (1 3/16 inches) farther down into the telescope than before, so be sure your focuser has that much extra travel.

Another way to get 4X is to use two 2X Barlows in series. This has the advantage of being shorter over-

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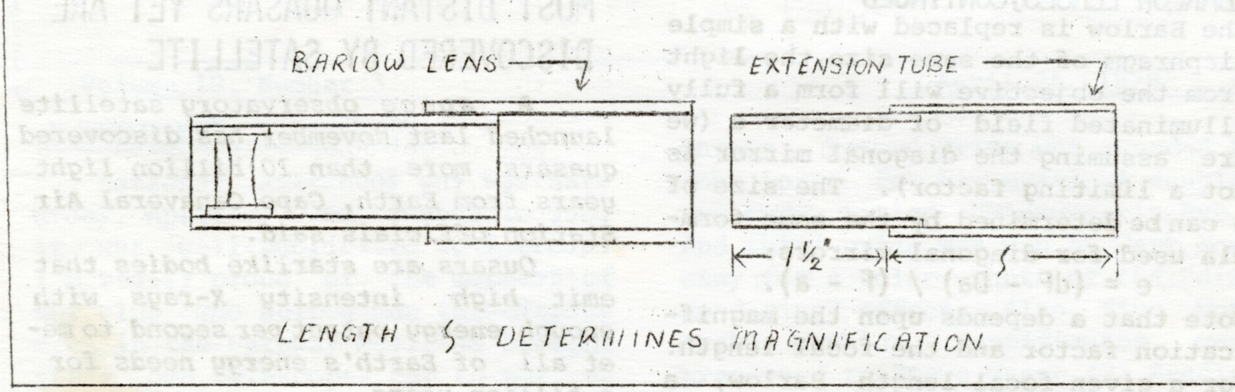

FIGURE 3

all, requiring no extra parts, and needing no extreme refocusing. Also each Barlow is being used at its design magnification and may give better image correction. Rick Johnson has had good luck using two Barlows this way, as you may remember. However, you will lose some of the available light, two Barlows cost a lot more than one plus an extension tube and the magnification will most likely not be exactly 4X, unless you use two identical Barlows from a parfocal set of eyepieces where the Barlow is parfocal with the eyepieces.

Another interesting possibility is to make an extension which also increases the diameter to two inches for large eyepieces. Before you begin protesting about vignetting, let's explore another characteristic of Barlow lenses.

Figure 4 shows the light rays from two different objects which are just barely within the fully lighted field formed by the telescope and Barlow. In order to calculate the diameter of fully illuminated field c, a little reasoning is needed. If

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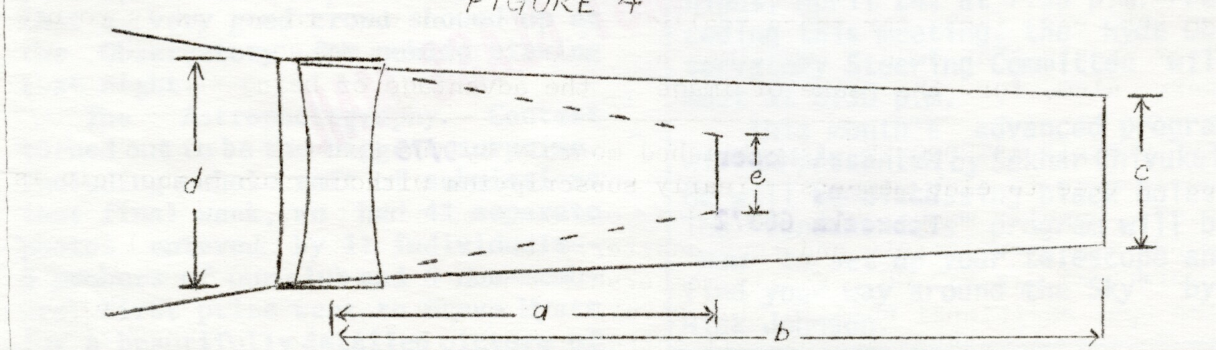

FIGURE 4

BARLOW LENSES, CONTINUED

the Barlow is replaced with a simple diaphragm of the same size, the light from the objective will form a fully illuminated field of diameter e (we are assuming the diagonal mirror is not a limiting factor). The size of e can be determined by the same formula used for diagonal mirrors:

$$e = (dF - Da) / (F - a).$$

Note that a depends upon the magnification factor and the focal length. For a given focal length Barlow, a particular magnification a is determined, and then for a particular telescope e is determined. With the Barlow lens in place the actual fully illuminated field is c = me.

Next issue, we'll work an example of this formula.

MOST DISTANT QUASARS YET ARE DISCOVERED BY SATELLITE

A space observatory satellite launched last November has discovered quasars more than 10 billion light years from Earth, Cape Canaveral Air Station officials said.

Qusars are starlike bodies that emit high intensity X-rays with enough energy output per second to meet all of Earth's energy needs for a billion years.

The newly discovered quasars are believed to be the most distant objects in the universe. Scientists said the discovery could have major implications for theories of cosmic evolution.

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