

Re: f-stop question

Source: <http://sci.tech-archive.net/Archive/sci.astro.amateur/2007-07/msg00115.html>

- *From:* Margo Schuler <mschulter@xxxxxxxxxxxxxxxx>
 - *Date:* 03 Jul 2007 03:26:38 GMT
-

Llanlzan Klazmon the 15th <Klazmon@xxxxxxxxxxxxxxxx> wrote:

"goodnigh" <goodnigh1@xxxxxxxxxxxxxxxx> wrote in [news:DRYhi.3032\\$tj6.44@newsread4.news.pas.earthlink.net](mailto:news:DRYhi.3032$tj6.44@newsread4.news.pas.earthlink.net):

Will be buying a 10 inch 1200mm f4.5 Dob.
After experimenting with inexpensive GoTo scopes,
I have decided to "GoTo" basic star hopping.
Somewhere I read there is an issue with fast scopes.
Just can't remember what they are.

mike

In the case of a newtonian like this a faster f ratio implies more off axis coma and greater sensitivity to accurate collimation. Exit pupil might be a problem if you plan to use 30mm or greater fl eyepieces.

Klazmon

Hi, there, Mike, and as a beginner in serious observational astronomy who's looking forward to first light for my new 20cm f/6 Dob, I might enlarge a bit on some of the points Klazmon has offered -- with the caution that I'm more familiar with theory than with practice! I'd be interested to learn myself how what I discuss below compares with people's experience, and would also invite any corrections.

First, one of the consequences with fast scopes is that eyepiece imperfections tend to be more obvious or significant in their impact on observing than with slower optics. For moderately priced eyepieces with wide-angle fields, the kind that you might well want to use to get the most out of the "light bucket" qualities of the scope for diffuse deep-sky objects (DSO's), faster optics may thus mean greater visual compromises of the kind Klazmon has mentioned: for example, coma as one moves out from the central area of the field.

With an f/6 scope, for example, I've gotten a couple of ultra-wide angle eyepieces: 30mm with an 82deg apparent field of view (AFOV); and 20mm with

Re: f-stop question

an 80deg AFOV. These fields of view are identical or almost so to the 82deg of the famous Nagler design: but obviously the quality will not be quite so high, for example when it comes to edge sharpness and correction!

If I had an Schmidt-Cassegrain telescope (SCT) at f/10 or f/12, for example, the visual performance of these eyepieces might not be too far from that of the more precise Naglers which they emulate: slow optics are more forgiving. With an f/6, it's a calculated compromise: a reasonable result might be a measure of sharpness for the inner 2/3 of the field, say, with things "softening" outward from there, and "space warp" effects in the outermost 10% or so of the field, with stars beginning to look like comets.

At around f/4.5 — precisely 10" (254mm) aperature and 1200mm focal length would be close but slightly slower, around f/4.7 — I'd suspect that the compromise would become less desirable, and one of the vendors in fact recommends something like f/6 as a lower limit where things should be reasonably satisfactory. In part it can be a matter of taste: someone tried one of these eyepieces in a Dob at f/5 or so as a kind of extreme test, and liked it — _despite lots of distortion_, however.

Again, I'm using the example of a specific and demanding application: other types of very useful eyepieces might not have these problems, and for really wide-angle eyepieces there are some that do well even in quite fast scopes.

One bit of conventional wisdom has it that if you choose the advantages of a faster Dob, then, all things being equal, you may need higher-quality eyepieces in certain applications to get comparable visual results. However, it's important to evaluate each eyepiece: reading reviews is one approach, and another is trying out eyepieces of interest, if made available by others, at a star party, for example ("try before you buy").

Also, TeleVue makes available a device called Paracorr to alleviate some of the imperfections of fast scopes around f/4.5 — a considerable investment, but something that some users who can afford it have reported can indeed improve performance with these scopes. Like TeleVue eyepieces, the Paracorr seems designed for exacting observers; maybe others here have used it and can comment.

A curious point is that your planned Dob has the same focal length as mine, 1200mm, so the same eyepieces would yield the same magnification. However, as Klazmon has mentioned, the exit pupil would differ with the f-ratio.

Let's suppose, for example, you find a good 30mm eyepiece which works well with your f/4.5 or f/4.7 scope.

One way of finding the exit pupil, the diameter of the light cone that meets the eye, is to divide the focal length of the eyepiece by the focal ratio of the scope. The concern to which Klazmon evidently refers is that if the exit pupil is larger than the actual size of the viewer's pupil, then some light from the image will be lost — effectively diminishing, from the viewer's perspective, the light-gathering ability

Re: f-stop question

of the telescope as if its aperture had been reduced.

For a young adult, the pupil of the eye might dilate to around 7mm when fully dark-adapted under dark-sky conditions. Here a 30mm eyepiece would yield an exit pupil of around 6.67mm at f/4.5, 6.35mm at f/4.72 (a 10" scope at 1200mm focal length), and 5mm at f/6. All of these should be fine.

For an older adult like myself, the eye might dilate only to around 5 mm. Thus we might have some effective light loss with a 30mm eyepiece at f/4.5 or f/4.7 — but I'd say not too much. The manual for my telescope, at any rate, suggests that an exit pupil around 6.4mm would likely be acceptable for just about any observer — but get into longer focal length eyepieces where the exit pupil increases to 7mm or more, and older observers, and eventually younger ones also, are going to experience significant virtual aperture reduction, as it might be called.

Anyway, more experienced people may be able to give practical advice and correct these newbie remarks, but I want to wish you the best with your coming scope and with amateur astronomy.

Most appreciatively,

Margo Schulter
mschulter@xxxxxxxxxx

.