

sci.astro.amateur: so called new approach to design doublet APOs. ;>)

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*From:* ValeryD (*aries\_at\_mercury.kherson.ua*)

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From: "tmboptical" <TMBoptical@a...>

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Subject: Optical Details on the Burgess 92mm Fluorite Apo

With Tom Davis' excellent review of the Burgess 92mm fluorite apochromat, and for a doublet, its color free performance, I thought it is the right time to explain why this telescope is so special.

All current doublet ED and fluorite doublets that are on the market today are not true apochromats. You may want to read the correct definition of what a true apochromat is on my web site at:

[http://www.tmboptical.com/itemsGrid.asp?cat\\_id=32](http://www.tmboptical.com/itemsGrid.asp?cat_id=32)

The ED and fluorite doublets refractors (even the highest quality), do not have three color crossings, where three widely spaced colors come to the same focus. They also all have a significant amount of out of focus violet. This may not be apparent at first, but when you compare, say a Tak doublet fluorite to a true triplet apochromat (TMB, AP), or a Newtonian, on a bright object, you then can easily notice the yellowish coloration, and the violet halo around stars like Vega or a planet (in a dark sky) like Venus, at high power.

This is because all ED and fluorite designs use a matching flint glass, such as KF-3, KzF-2, and other flints that are at the same general point in the partial dispersion area on the glass charts. The partial dispersions of these flints do not match up well in the violet and very deep red, to the ED or fluorite elements, and the result is visible color.

Now you might ask, how is it that the Burgess fluorite doublet can have so much better color correction, so much

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so that there is no color in focus at all, and only the smallest trace of out of focus color on a star like Vega, and that assumes that you have good color vision, and know how to look for very small color errors.

The secret is that the Burgess fluorite doublet uses a special crown element with the fluorite. Again, on the partial dispersion glass chart, you can see that this special crown glass has almost a perfect partial match to fluorite, and thus, the one element cancels the color of the other element to an exceedingly high degree. So much that it has the color correction of a triplet lens, and like a high quality triplet apo, has three color crossings too.

This is the ultimate way to make a production fluorite doublet. I have designs on my computer using the same fluorite/crown glass at larger apertures, that have the same or better color correction, at only a small increase in focal ratio. Or, in other words, this lens scales up nicely, and can give the same color free performance in larger apertures.

This is truly a new level of performance in the fluorite and ED doublet market. We are very proud that we can bring this product out to the marketplace, and at a price that is more than competitive.

Thomas Back  
TMB Optical

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Dear Mr. Back,

Sure, your self-confidence has no limits. And as one, well known in optical design and manufacturing, person said, someday your head will explode due to your unlimited self-confidence.

I should mention specially for your instance, that ARIES 7" F/8 Fluorite objective you saw at one StarParty (AstroFest?) which was with cracked fluorite element has the design, which is essentially the same, as you called "truly a new level of performance in the fluorite and ED doublet market". Also, I should to note, that these ARIES objectives were designed and made about 7 years ago. The largest one was 12" F/9. And right now we making tubes for a serie of 6 such 7" F/8 Fluorite doublets. It will be useful to note also, that these doublets has color correction,

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that in 430nm–656nm range, is same good as LZOS made TMB 6" F/8 Super SD TRIPLET. And, of course, such objectives has better contrast, that these triplets (include 175mm ones) because they have two surfaces less, shorter lightpass in the glasses. These doublets also have significantly shorter colldown time. Objectives have lesser mass and a telescope has better balance.

Of course, I am not a first person, who know this approach to APO doublets design and manufacturing. So, this approach to design can't be called as "truly new level". Please, note this specially for yourself.

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