

## Re: Simple telescope design question

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Robert Maxwell Robinson wrote:

- > *Hi, I'm new to the group. I have been learning about telescope*
- > *designs for a month or so, and have a question that I haven't been*
- > *able to find the answer to; I thought one of you might like to answer*
- > *it.*
- >
- > *Would it be a Bad Idea to reverse the order of the two mirrors? The*
- > *flat elliptical mirror would have to grow to have the same diameter*
- > *(along it's \_shorter\_ axis) as the parabolic mirror, and would be*
- > *similar in position to what I think is called a Steering Mirror.*
- > *Light would hit the steering mirror, then the parabolic mirror, then*
- > *pass through a hole in the steering mirror and go directly into the*
- > *eyepiece, like this (only longer):*
- >
- > *pppp.....S*
- > *ppp ... S*
- > *pp ... S*
- > *pp ... S*
- > *p ...*
- > *p...../= Eyepiece*
- > *p ...*
- > *pp ... S*
- > *pp ... S*
- > *ppp ... S*
- > *pppp.....S*
- >
- > *I can't believe noone has considered this simple variant on a*
- > *Newtonian before; so does anyone know the name of this design? Also*
- > *I've never heard of one being constructed, so there must be some*
- > *significant problem with it. Can anyone tell me what it is?*

You have described (very well) the telescope Charles Fundingsland invented, built and patented in the 90's, called the "Fundyscope". Mr. Fundingsland published his 6" aperture design in S&T, but I don't recall the year and month – maybe someone can look that up. The George B. Wren II Supernova Search Telescope (SNST) at McDonald Observatory is the largest Fundyscope in the world, with a Galaxy Optics 18" f/4.5 primary

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mirror and 24.25" diameter steering flat made by Mike Marcario at High Lonesome Optics. I derived the tracking equations and algorithms for SNST, and Wayne Rosing (also a VP at Google) implemented the tracking equations and made the thing work, and it worked very well. Bill Wren used it to discover several supernova. See <http://hej3.as.utexas.edu/~www/SN/>.

The Fundyscope steering flat has to be VERY flat to prevent image astigmatism, on the order of 1/20 wave peak-to-valley, and must be supported by an edge/back flotation system that can maintain that flatness over the full angular pointing range. Achieving 1/20 wave P-V precision on a 24" flat right up to the edge requires a truly skilled optician such as Mike Marcario. The hole in the flat must also be a tapered 45° cone to prevent vignetting the field at maximum mirror tilt. Making the steering flat is the main drawback to Fundyscopes.

Mike