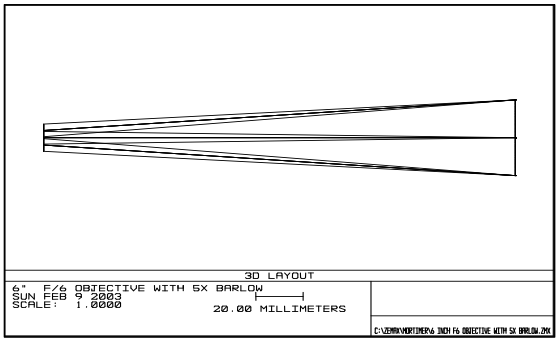
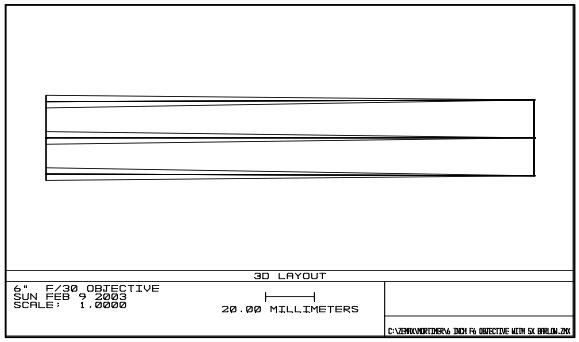
Baader Telecentric Systems for H-α solar filters

The Baader Telecentric Systems 2x and 4x presents an optimal way to achieve a parallel f/30 beam with every refractor. This is necessary for presenting Hα details evenly across the entire field of view of solar filters from "Solar Spectrum".

The telecentric is often confused with a barlow. Both can be used to magnify the focal length. "Telecentric" is not a synonym for parallel beam. Telecentrics are designed so that the exit pupil lies at infinity, which means that the center ray from any point in the field appears to come from infinity and is therefore perpendicular to the image plane and parallel to the optic axis. This means that the off axis beam arrive at the image plane with the same angular geometry as the axial rays. All field elements look as if they where like they are on axis, across the image plane and unlike a barlow, the edge field rays are not tipped bundles.



This represents a 6" refractor with f/900mm equipped with a barlow lens. Note that the bundles shown may equal an f/30 optical system but the field angle is large relative to the central rays.

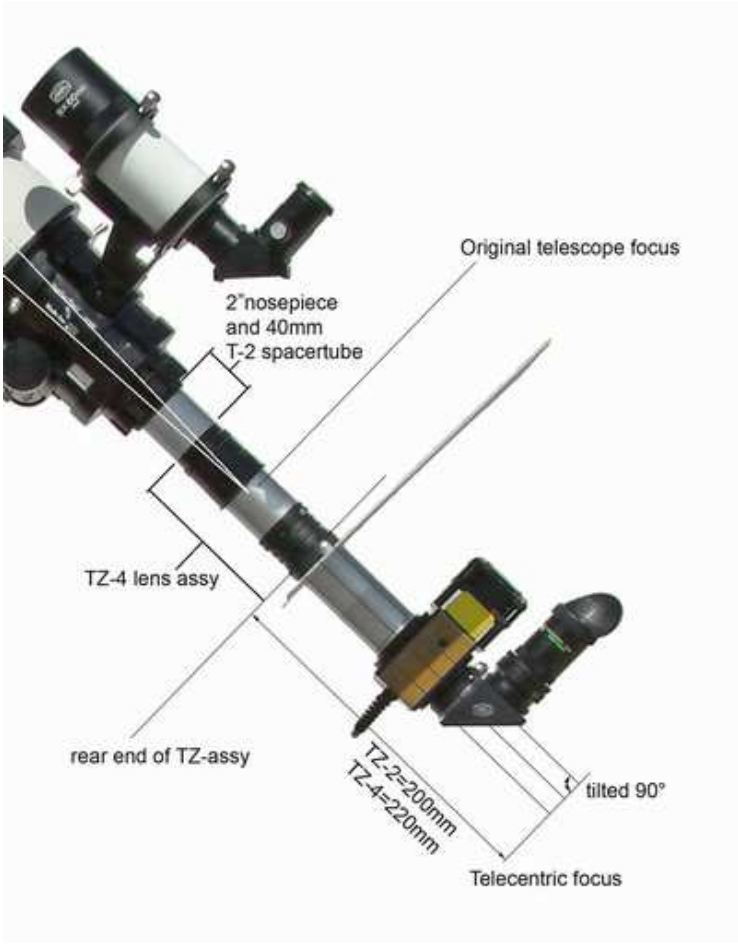


This ray trace shows an f/30 telecentric design. The rays are uniform across the image plane. This does not mean that they are all going through the filter perpendicular to the image plane but the rays are parallel to the central rays.

Because all the principal rays across the image plane are perpendicular to the image plane. The rays at the edge of the field will pass through an etalon just in front of the focal plane with exactly the same geometry as the rays on axis. So in a f/30 telecentric refractor the etalon sees the exact same 2.5degree geometry clear across the field, and the spectral bandpass does not shift the wavelength across the field.

Telezentric System 2x and Telezentric System 4x

SETTING UP THE TELECENTRIC



- Place D-ERF prefilter and telecentric lens assy onto the telescope without the "Solar Spectrum" Hα-filter attached. Point the telescope at the sun

- Find the proper spacing. Please use a 200 mm long poster tube with paper screen for the TZ-2 and 220 mm long tube w. paper screen for the TZ-4. This should automatically result in being able to get the TZ's into the right focus position because there is no sharp focus if the general position of the TZ body relative to the telescope focus is not right.

- For the TZ-2 (item No.2459255) the original focus position is ~ 85 mm behind the front end of the telecentric lens assy.

- For the TZ-4 (item No.2459256) the original focus position is ~ 55 mm behind the front end of the telecentric lens assy.

- Place the the H-alpha-filter from "Solar Spectrum" on the back of the telecentric assy but as near to the eyepiece as possible – see the image above. Without moving the focuser, check to see if the image is in focus, if not move the eyepiece up until the image comes into focus, again without moving the focuser itself. This defines the proper spacing for the telecentric (we recommend the "ClickLock" clamp: www.baader-planetarium.de/download/cliclock_t2.pdf) for precisely adjusting the correct spacing of the focus for eyepiece or webcam behind the T-2 system

- Try to keep the spacing as designed and explained above. Still you will have some tolerance on either side of the recommended spacing. The image will retain it´s full contrast even when the exact spacing of 200mm or 220 mm would vary as much as 1/2". This is necessary because the glaspath in the various accessories and the filter itself would cause some unavoidable variation to the given values. You may find that the image looks fine when you simply focus the telescope with all parts attached - after having applied the "poster tube focusing method" first.

- Note: This is a dedicated H-alpha Telecentric-Accessory. The design was made for us at Carl Zeiss. The optics design delivers 99 % Strehl at 656.3 nm . Both TZ-systems are NOT intended to work as a barlow lens ! In fact even the coatings are designed to reduce the light of other wavelengths in the best way possible – so to ensure that only the H-alpha passband at 656.3 nm will transit through the TZ-optics without ANY loss in intensity.

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