

## EP (ExoPlanet) objects Sequencing Guidelines

Foremost, Exoplanet Stars are not Variable Stars. Therefore, our Guidelines need to be different in support of those attempting to detect mill-mag changes ( $\sim .002$ ) in the targets V magnitude due to the passing of a planet across its disk.

*Excerpts From A practical Guide to Exoplanet Observing Revision 4.2 October 2018 by Dennis Conti and Used by TESS TFOP SG1 small telescope follow up observing program.*

*1. Ideally, at least 8 comparison stars should be chosen whose magnitudes are as close as possible to that of the target star – i.e., no greater than 0.75 in magnitude (i.e., fainter) and no less than 0.44 in magnitude (i.e., brighter) than the target star. If this is not possible, then an ensemble of comparison stars should be selected such that the average of their aperture counts are close to that of the target star. ...*

*2. The comparison stars should ideally be of similar stellar type ( assume B-V) to the target star in order to minimize the differences in atmospheric extinction.....choosing comparison stars of similar brightness to the target star is more important than choosing stars of similar stellar type.*

As an example, given the criteria [i.e., no greater than 0.75 in magnitude (i.e., fainter) and no less than 0.44 in magnitude (i.e., brighter) than the target star] if the host star has a magnitude of 11V then the potential comp range would be (all V):

11.7, 11.6, 11.5, 11.4, 11.3, 11.2, 11.1, 11.0, 10.9, 10.8, 10.7 & 10.6

**8 Comps, at a minimum, should always be the goal and The EP group we are currently working with has specified a FOV no greater than 30 arcmin , centered on the target , (see below paragraph RE offset) for their requests (E Scale)**

From experience, we have discovered that there are some FOV's where only three or four comparison stars are reasonable available within 30 arcmin, even if extending the criteria V range....It is what it is. Occasionally, a sequence can be created with a small offset (5-10 arcmin) in the FOV; if this is necessary, then it is important the requestor be so informed of the offset and preferably with  $\sim$  coordinates for the center of the offset FOV.

Lastly, the use of duplicate labels for EP sequences is permitted when needed to meet the criteria and will occur with some frequency based upon current efforts.

Tim Crawford

Below are some remarks from Arne, but in 2012 as a FYI:

FROM:•Arne HendenTO:•Tim CrawfordCC:•Sequence TeamFriday, February 24, 2012  
1:50 PM

Exoplanet sequences are a little different. First, notice the range -this is purely CCD. Second, almost all stars are variable once you get down into the millimagnitude level, so picking just one comp star of just the right brightness and color would be great -if you could guarantee that it was constant. APASS and any 2-3 night calibration won't tell you the definitive answer regarding variability at this level.

So what I would recommend:-see if there is something within one magnitude of the target with similar color, preferably spatially close.If so, that is the first choice. Make your choice based on the color of the target and its similarity to the color of the comp than our 0.4-1.2 (B-V) rule we use for visual sequences. Then pick up to a half dozen other stars within a couple of magnitudes of the target, either brighter or fainter. At  $V=9.75$ , you will be hard-pressed to get a good comp star.I often use an ensemble of 6-12 fainter stars, using the large number of comps to reduce the noise. I have a choice, I find comps so that they don't end up with the same tenth-magnitude label. If the nearest 10th magnitude star is 20-30arcmin distant or more, the observer is going to have a hard time doing this target!

Arne