

Backup method for calibrating your photometry

You need to calibrate the relation between counts per second and the flux (or "magnitude" on a log flux scale). Once you do this, then you can measure the magnitude (or flux) in your object. Be sure to subtract off an equal number of sky pixels using some clean sky area.

But suppose your plans for observing a calibration standard star were dashed. Perhaps clouds came in just when you were about to do your observation. As a backup, you can get ~3% accurate stellar photometry from secondary standards in the USNO database of photometry which was done using the Tycho-2 catalog and data from the Hipparchos satellite for stars brighter than 12 mag and other sources for fainter stars. If you do several stars in your field the accuracy will improve.

First look at your image data in DS9 with north up, east left and see where there are some isolated stars in the field (away from your nebula and nearby stars) which are *not saturated* in any of the filters for which you need calibration. Look at the central brightest pixel in your star and make sure it is well below your camera A/D count maximum. Of course you also don't want to go too faint because the precision will be poor both on your data and the USNO data. There are probably only one two such stars in your 24 arcminute square field.

You can then go to

<http://www.nofs.navy.mil/data/fchpix/>

and simply enter the name of the object (such as M27, and then checking "resolve name" box to automatically get coordinates).

Then enter rectangle 24, 24 for the finder chart box size in RA and Dec arcminutes.

Select NOMAD catalog.

Compress Ascii files: No

Check: Label Stars

In Finder Charts, select Center Mark of 1 arcmin.

Then uncheck everything in the Catalog Lists except:

ID

Flags

Magnitude [select range 7-10, but may want to go a bit fainter for M76]

Star/Galaxy index

and then Retrieve Data.

You then get a 24 arcmin square finder chart with star names.
You can click "NOMAD1.0 Star list"
and you get a listing of stars in the field and their magnitudes in multiple bands.

Use B and R magnitudes, depending on the wavelength of the filter you need to calibrate.

Note: You do not need to make differential extinction corrections for the atmosphere airmass difference between a calibration field and your object field, since you are using a star within your main CCD field as calibrator.

Now you have a relation between counts/sec for your entire camera+telescope system and the magnitude in your B or R filter. Then you can get a good estimate of your calibration in the narrow band filters by looking at the peak of their transmission curves.

More information on NOMAD

http://www.nofs.navy.mil/nomad/nomad_readme.html

A more refined analysis is available using a similar procedure at

<http://vizier.cfa.harvard.edu/viz-bin/VizieR-3?-source=VI/135/table15>