Week 3 - Exercise 4 Answers

IF you cursed at the earlier exercise involving ST Aur, don't try this one. Take a break. (Read the VPhot Guide again!) ;-)

If not, give it a go. It tells you a little about the choice of filters when analyzing difficult variables and options for filters with Mira variables.

Ken

This is a different exercise that shows the impact of filter band on the target, companion and aperture. Last one for the week.

1. Select ST Aur V images. Open this faint image (i.e., 141029, 12:09:19). Load AAVSO comps and VSX targets. Clear any unidentified stars. Delete any saturated comps (2?). Use 132 as check. Change centroid settings under tools to 2-2. Change aperture settings to 2-6-6. Save sequence.

> **ANS**
>
> *Deleted comp 106 & 93 as saturated (or almost saturated) stars.*
> *Completed sequence and save it.*

2. Re-open image. Confirm aperture radius of 2 pixels includes only the target and exclude most of the companion. Zoom in to confirm.

> **ANS**
>
> *After image was re-opened, had to apply saved sequence. 2-pixel aperture radius covers most of ST Aur. There is some flux around 4 o'clock extending out 2-pixels from AT Aur.*

3. Run a time series of all V images BUT in the first case use a fixed aperture of 2 pixels. Record/report the Max and Min magnitudes.

> ANS
>
> Missing parameter specifications for running the Time Series, so set Sequence to the saved sequence from Step 1 in this exercise; aperture set to Fixed, with radius 2.0 pixels; Min. SNR set to 20; Search radius set to 5 pixels; Initial FWHM set to 5 pixels
> **RESULTS**
>
> | Name | Min | Max |
> |---|---|---|
> | 2MASS J06140933+4638387 | 13.945 | 14.865 |
> | ST Aur | 11.712 | 14.880 |
> | VZ Aur | 10.913 | 11.069 |
> | 132 | 13.132 | 13.226 |
> | 114 | 11.381 | 11.500 |

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117	11.605	11.714
125	12.380	12.509
137	13.649	13.754
139	13.755	13.961
142	14.171	14.687
147	14.581	14.763
150	14.922	15.109
159	15.756	15.982
159_1	15.509	15.971
162	16.180	16.335

4. BTW, can you run a time series with all the images/filters together?

ANS

No, you can not run a time series with all the images/filters together.

5. Run a time series of all V images BUT use a fixed aperture of 10 pixels. Record/report the Max and Min.

ANS

NAME	MIN	MAX
2MASS J06140933+4638387	13.700	14.493
ST Aur	11.490	13.407
VZ Aur	10.903	11.293
132	13.064	13.438
114	11.393	11.802
117	11.593	12.029
125	12.363	12.734
137	13.614	14.059
139	13.739	14.242
142	13.913	14.447
147	14.383	14.921
150	14.743	15.247

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159	14.289	14.998
159_1	-	-
162	14.998	15.329

6. Explain what difference you find?

ANS
Comp 159_1 could not be calculated.

If you used too large an aperture for your analyses, would you miss the true V minimum of ST Aur?

ANS
Yes, it is highly possible.

7. Repeat this time series process with the same saved sequence (do not create a new one) but use I filter images in this case.

ANS
Okay.

8. Record/report both of the Max and Min again.

ANS
Ran the test using 10 pixels as the aperture fixed radius.
RESULTS

NAME	MIN	MAX
2MASS J06140933+4638387	12.712	13.189
ST Aur	8.720	10.143
VZ Aur	10.526	11.132
132	12.240	13.050
114	10.978	11.955
117	10.429	11.247
125	11.347	12.549
137	12.725	13.311
139	12.997	13.233

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142	13.198	13.198
147	-	-
150	-	-
159	10.987	12.841
159_1	-	-
162	-	-

9. Why is the result quite different?

ANS
The results are different due to the filter characteristics.

If you used too large an aperture for your analyses, would you miss the true I magnitude of ST Aur?

ANS
Yes, it is highly possible.

Does it tell you something about the characteristics of ST Aur and the companion?

ANS
Yes.

Why is this target so bright in the I filter?

ANS
Different wavelengths of light will have different magnitudes.

Don't worry about the fact that the apertures are not ideal in either case, just try to understand the significant differences in the max and min values for the different filters. Looking at these apertures in a few images at max and min in both filters helps understand. Do not over analyze this crude experiment! Running a long period time series for this target would be a BAD idea! You should analyze the grab samples individually during its full period.