Note for last two weeks

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1 RAMP EFFECT

- 2 ways
- check the paper

- In *Wilkins et. al. 2013*

  The ramp effect is neglectable when exposure level is below **30000** electrons per pixel.

- In *Deming et. al. 2013*

  They expected ramp effect to be weakly detectable in their data when their exposure level is about **40000** electrons per pixel.

In our data, the maximum exposure level at the secondary image is ~2000 e^- per pixel, which is far below 30000 e^- per pixel. Therefore the ramp effect in our case should be small enough.

2 PSF PHOTOMETRY

>plot PSF photometry with aperture photometry

2.1 GENERATE PSF

1. for the same filter and the same rolling angle, the center of the secondary is not exactly at the same position. Using mpfit2dpeak to measure the secondary centroid, the maximum difference in both x and y direction could be as large as 0.05 pixel (measured by cross correlation). *This effect would enlarge the fwhm of the synthesis PSF.*

-> align the image again when generating PSF - fshift (a linear interpolation) will slightly change the PSF – enlarge the FWHM, this problem will be alleviate by oversampling with a cubic interpolation, but could not be eliminated - without second alignment with secondary object, synthetic PSF FWHM – 1.93 pixels - align again with secondary object, synthetic PSF FWHM – 2.00 pixels.

2. *how to normalize the PSF? now, I use the flux in 5 pixel to normalize

3. Large chisq - caused by underestimated of error?

>aperture radius vs standard deviation >use aper.pro to measure photometry and uncertainty

Optimum aperture size is related to the estimation of background fluctuation. A difference of 1 count/pixel difference in background fluctuation could lead to 0.5 pixel change in optimum aperture radius. Aper.pro routine provides 2 ways to define sky fluctuation: 1. directly input sky level and fluctuation when calling the program. The sky value and sigma should be calculated before hand. 2. input annulus radii of the sky region and let the program calculate it. The sky region here must be an annulus around the secondary object in this case.

I choose to calculate the sky fluctuation separately rather than let aper.pro calculate.

1. if the annulus is too close to the secondary object, the flux of the secondary image could contaminate the sky and end up with a higher estimation of sky level and an inaccurate estimate of sky fluctuation. 2. The annulus radii cannot be large too. Because the slight change of PSF, the image of the primary cannot be removed completely. The residual of the primary image fluctuate largest at the center region as well as the diffraction spikes region. When the annulus radii get slightly larger, the annulus would include these region. If the annulus radii get even larger to avoid these region, it would cause an under-estimate of the sky fluctuation because the area of this annulus is not affected by psf subtraction.

The optimum aperture radius turned out to be very small, it ranges from 2.8 to 3.5 pixels. which is only 1 pixel larger than fwhm of the image, which is 1.8 pixels.

3 ANALYZE LIGHT CURVE

>1. is the source varying >2. what is the amplitude in two colors

According to aperture photometry, the peak to peak variation is about 2>3. is the change periodic At least, it is difficult to find a period by eye.

>4. are the changes in the filter correlated

5. color magnitude diagram (Apai 2013)