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HW 05: IMAGE PHOTOMETRY

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1. INTRODUCTION

The variable represent another kind of unusual star. The majority of these are stars whose brightness fluctuates regularly as they alternately expand and contract. As in the case of the peculiar stars, the variables are normal stars in special stages of their lifetimes, where particular combinations of atmospheric pressure and ionization conditions produce instabilities that cause the pulsations Snow (1984).

-possible reasons for variability in young stars it has been inferred that young stellar objects (YSO) variability arises from a combination of physical processes operating at and near the stellar surface. Overall, our results point to multiple origins of young star variability, including circumstellar obscuration events, hot spots on the star and/or disk, accretion bursts, and rapid structural changes in the inner disk. Cody et al. (2014)

-how one tries to determine if a particular star is variable The highlight of this work is detailed analysis of 162 classical T Tauri stars for which we can probe optical and mid-infrared flux variations to 1% amplitudes and sub-hour timescales. Cody et al. (2014)

-what is the evidence that J1614-1906 is a young star The presence of nearby massive stars affects the evolution of young stellar objects and their proto-planetary disks in OB environments. Preibisch (2008)

-in general, what do we know about J1614-1906? Be sure to include its R magnitude from the literature J1614-1906: The second source detected in our line survey also has the fourth largest dust mass in Upper Sco as determined by millimeter photometry (Mathews et al. 2012b), 0.015MJup. However, the large extinction suggests the star is being viewed edge on through a disk, and large NIR excess suggests we may be directly viewing the disk inner edge. In addition, the high ratio of the [OI] 63 m line to 63 m continuum indicates this system may be driving a jet. This star has the second highest Hα equivalent width in Upper Sco, -52Å, which suggests an accretion rate 109 M$_\odot$/yr using the conversion presented in Dahm (2008). In addition, strong emission has been detected in the [OI] 6300 Åforbidden line (Montesinos, in prep), a common indicator of jets (e.g. Cabrit et al. 1990). We defer modeling of this system to a later paper. Matthews (2012)

USco-	R [mag]	W (Li) [Å]	W (Hα) [Å]	SpT	A$_V$ [mag]	log(T$_{eff}$) [K]	log$\Big($
161420.2 -190648	13.2	0.37	-52.0	K5	1.8	3.630	-0.5

Table 1. Data for the star, including r magnitude, clean up for final draft.

Find if the star is a variable. Purpose of study.

2. APPARATUS

Telescope information and methods in header. Think about removal in final.

3. PROCEDURE AND OBSERVED QUANTITIES

Use observations of a nearby standard star to determine how bright J1614-1906 is in one image. Compare with the r-band magnitude you will find in literature.

Find background and obtain mean, standard deviation, and n-pixels. Use algorithm created to localize star (make sure the box dimension and method are identical for each image). Apply background subtraction to image.

Total image size, in both pixels and angle on sky -Number of Pixels: 9000, Mean: 56.6589 -Degrees: 243.584699086 -19.1134932256 Sexigesimal: 16h14m20.3278s -19d06m48.5756s

Region and aperture size used for photometry, X Y position of the star in the image. -True ra: 966.805233773, True dec: 1047.90124754 -Aperture: 20 x 20 pixels

4. RESULTS

Find flux of star using magnitude equation.

$$M_{star} = -2.5 \log \frac{F_{star}}{F_{standard}} + M_{standard} \tag{1}$$

$$\sigma_m = Mstar \sqrt{\left(\frac{-2.5\sigma_{star}}{F_{star}}\right)^2 + \left(\frac{2.5\sigma_{standard}}{F_{standard}}\right)^2} \tag{2}$$

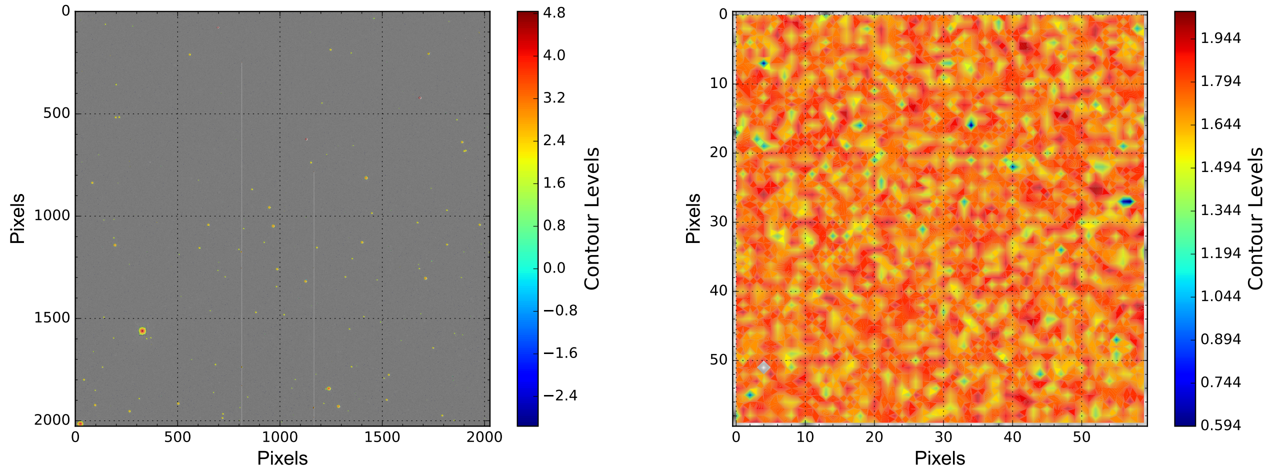


Figure 1. Full sky and background, work on color bar and labels.

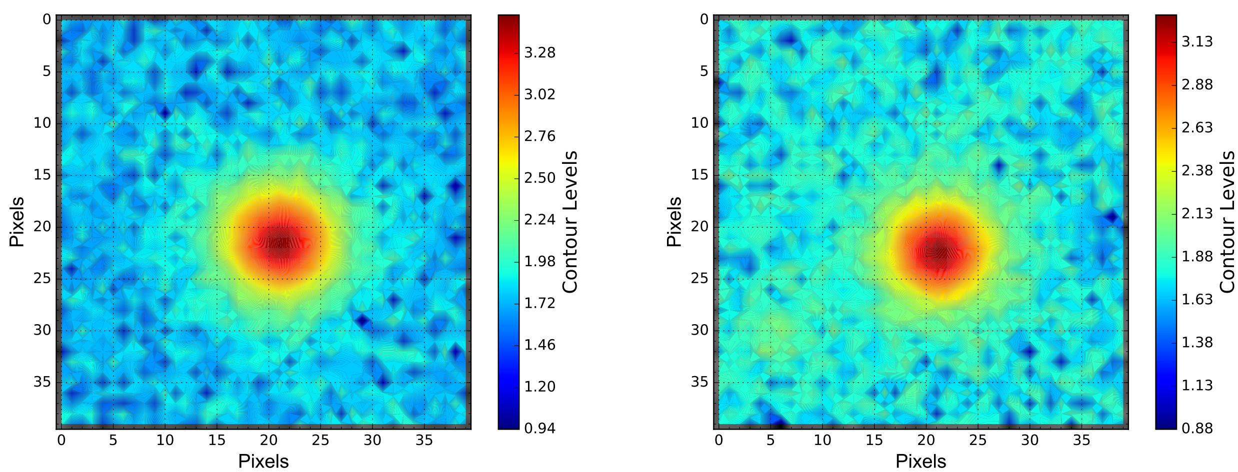


Figure 2. Two methods of finding the star, one on the right is a different algorithm and works by converting coordinates.

Flux vs. time plots. Find flux for each image and plot flux over time interval. Compare flux with standard star, possibly normalize.

Check if star is variable through flux/brightness. Compare results to literature and definition of variablilty.

5. DISCUSSION

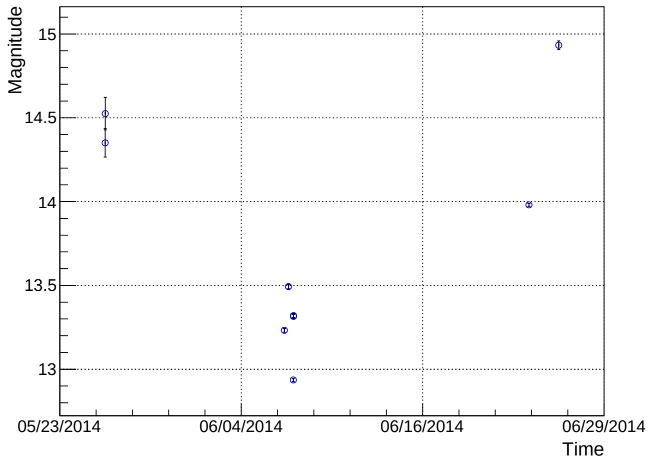
REFERENCES

Snow, Theodore P., and Theodore P. Snow. Essentials of the Dynamic Universe: An Introduction to Astronomy. St. Paul: West, 1984. Print.

Cody et al., 2014, Astronomical Journal, volume 147, p. 82

Preibisch & Mamajek, 2008, from the book Handbook of Star Forming Regions, Volume II, ed. B. Reipurth.

Mathews, G. S., Williams, J. P., & Menard, F. 2012, ApJ, 753, 59



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