Astronomy 337: Instructions for...
PhotVis: A Photometry and Visualization Application in IDL

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1. Type 'photvis' at an IDL prompt.

2. Open a FITS file (or restore a saved PhotVis session), located under the 'File' tab at the top of the PhotVis window. NOTE: reading FITS extensions is **not** supported yet! If you have images in extensions, read them in and rewrite them as the primary data unit of a FITS file.

3. From here, we have a basic FITS image viewer... Grayscaling, zooming, panning, mouseover readouts of pixel position and value, left click for imexam-like plots and local statistics, etc. are available. You can hit the 'Info' tab to get at the image's FITS header, in a nice little text window.

4. **WARNING: For all text or number entry boxes, make sure to hit ENTER/RETURN after entering any new value or else the program won't see it!**

5. Object detection and selection:

   (a) The autodetector... Hit the 'Configuration' tab, and choose 'Object Detection'. This spawns a configuration window. Put in a ballpark value for your 'FWHM' in pixels and in 'Sigma Threshold', enter a number of standard deviations above local background noise for valid autodetections (10 is just a recommendation, I often go to 7-sigma or lower and visually filter out spurious detections. Too low and these spurious detections will dominate the objects found. It's definitely a good parameter to play with.), set or leave the roundess and sharpness limits as you choose, and hit the AutoDetect Active radio button to start things up! Once things are done (this can take awhile!), all the green overplots are considered "good" detections, all red overplots are considered "bad" detections (they were detected but failed one or more of the roundness or sharpness criteria), and blue are manual selections, which are described next!

   (b) Manual object selection... Double left click on objects and they can be added to the object list as user-selected "good" objects, represented by blue overplots. One can add totally new objects, or simply change the status of "bad" objects to good objects. NOTE: Manual object selection can be done with or without running the autodetector!! However, if you change the autodetector settings once it's been run or enable the autodetector after having manually

selected some objects, all user changes are reset!! So if you're going to manipulate the autodetected objects manually (and it's strongly reccommended that you do!), do so only after you have settled on your settings for the autodetector!!

6. Object examination and sorting:

   (a) Sort through your objects, using the visualization tools. Once you have valid objects, right-click will jump the imexam box to the nearest detection ('good' or 'bad'), and will also readout the current photometric measurements for that object. If you find a "good" object that is actually a cosmic ray hit or the like, double right-click sets 'good' objects to 'bad' with a confirmation dialog. It does 'bad' to 'good' as well, though double left-click does this too and avoids the confirmation dialog.

   (b) Multi-object selection mode (set by a droplist just above the main image viewport that defaults to 'ImExam Mode') allows you to click and drag a box around multiple detections and set all of them to 'good' if it's a left-click and drag or 'bad' if it's a right-click and drag. There is a confirmation dialog for this as well.

7. Aperture photometry config... Under the 'Configuration' tab at the top, choose 'Aperture Photometry'. This spawns a configuration window that allows you to set the default aperture radius, as well as the default inner and outer sky annulus radii. There's also a setting for the gain in Photons per ADU which defaults to 1. Finally, there's the magnitude zero point setting. This is the magnitude of 1 ADU above the sky level, and if changed, all the objects magnitudes are offset accordingly, allowing you to calibrate the results.

8. Overplots config is pretty self-explanatory, and is where most of those rotten lack of error checking bugs are.

9. Session and results saving... Saving your PhotVis session and your PhotVis results is probably a good idea. Both options are under the 'File' tab. Both the saved session file and the saved results file are saved using the IDL 'save' procedure, so they should be portable across platforms IDL supports, and they can be cracked open and looked at within an IDL session using the 'restore' procedure. (NOTE: To save disk space, PhotVis only keeps the file name of the FITS file used when a session is saved. Thus if you move your data, more likely than not, restoring the session file will confuse PhotVis and spawn a file-selection GUI with which you must pick the associated FITS file.) When you save your results, PhotVis prints to your terminal the restore command to bring the array into an IDL session, as well as the column format of an individual detection. The restored result is just a 12

by n_objects floating point array named 'pv_dat', so it's real easy to access. From there, one can easily continue on into PSF-fitting if need be. A full DAOPhot implementation is in that IDL Astronomy User's library.