

## MedOptics CCD @ D1 Usage Notes:

**SPEC and the Medoptics:** The medoptics CCD is controlled by an NT computer in the hutch. The NT computer runs an IDL script ("allez") that synchronizes exposures with the D1 station computer via 4 TTL channels. When running, all exposures are triggered by normal scan & ct commands from within SPEC on the station computer.

**CCD Operation:** In ccd mode (**ccd\_on/ccd\_off**), the medoptics ccd takes one exposure for every point in every scan. "tseries 2 1" would therefore take 2 1-second exposures. You can also use dscan, (same as lup), or ascan. For example, "dscan samz -1 1 6 1" would take exposures at 6 (actually 7) different positions of the motor samz.

**Acquiring Dark Images:** In ccd\_mode, use the custom scan command **dseries** to acquire dark images. "**dseries 2 1**" takes two, 1-second dark images.

**CCD pixel size:** 21.19 pixels/micron, 47.19 microns/pixel

**X-ray shutter:** **ALWAYS DISABLE THE GARAGE DOOR BEFORE MANUALLY OPENING THE SHUTTER.** This is a sanity check to keep you from opening the garage door (to take images) without first closing the shutter. Manually control the shutter with **opens** and **closes**.

**Garage Door:** The 'cycle shutter' / open button on the garage door controller sometimes has to be pressed several times. Alternating with the close button sometimes helps.

**Filenames & Locations:** The spec command "**newfile**" changes the name of both the spec data file and the base name for ccd images. Raw images are always stored in ~specuser/images/.

**Viewing Images:** ImageJ, a clone of NIH image, is an easy gui to view images & perform limited operations. Type "**imagej**" at a shell to invoke.

**Opening an image:** Use File->Open or Plugins->OpRecent. **Plugins->OpRecent** also **rotates** the image 90 degrees right so that the image is properly oriented (as if looking towards the source).

**Brightness/Contrast:** "CNTL-SHIFT-C" or Image -> Adjust-> Brightness/Contrast The custom command Plugins -> OpRecent opens the most recent file saved to the current (last used) directory.

**Maximum count:** Use the rectangle tool to define a region, then "CNTL-M" or Analyze -> Measure. (You may have to Alt-Tab to find the 'Results' window)

**Open Image Sequence:** File->Import->Image Sequence: Next highlight one of the files you want to import. In the following dialogue box, enter the common string in the "Filename Contains" box (ignore the rest of the dialogue box)

**Image Calibration (distance):** Analyze -> Set Scale: 21.19 pixels / micron

**Distortion/Intensity/Dezingering:** A command line program "medcorrect" is available. Type "**medcorrect**" at a shell prompt to see brief usage note, or "**medcorrect --help**" for extensive help. Matlab is also installed on the station computer. Correction files are in ~specuser/ccd\_corr.

**Medoptics fault:** First, try re-issuing "**ccd\_on**". This checks SPEC's configuration and puts things into a known state. If the medoptics stops taking new exposures and nothing else seems wrong, it is probably a known communications bug. First, shutdown the NT computer (blue rack in hutch). Next, power off the bottom-most black box just behind the LCD. Repower the computer first, then the black box after a minute or so. Logon as specuser, and start IDL (IDLDE icon on the desktop). Next type "allez" at the IDL command line to start eh control script. The top IDL window should read "Waiting for enable signal. Press 'q' to exit".

**Taking auto-corrected images:** To generate corrected images, first, in a UNIX shell, create a base directory for dark and corrected images in the specuser's home directory, e.g. "**mkdir my\_group**". Next, within SPEC, type "**ccdroot**" or "**ccdroot my\_group**" to setup file locations in spec. Next, "**dark 5**", e.g., takes two 5-second dark images and place their dezingered average into ~specuser/my\_group/dark/dark5.tif. Once a dark image is available for the exposure time you need (in this case 5 seconds), use "**corr 2 5**" to take two real images, dezinger them, subtract dark5.tif from the result, and finally perform and intensity and distortion correction. The result is placed in ~specuser/my\_group/corr/. The command "**corr**" behaves like tseries ,except that the first argument, the number of points, can be only '1' or '2'. If it is '1', then the image is background-subtrated and corrected, but not dezingered.