ITL Cameras

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ITL Cameras

This site contains information about camera systems developed and maintained at the University of Arizona Imaging Technology Laboratory (ITL).
Most of these cameras are installed on Steward Observatory telescopes.

See http://azcam.itl.arizona.edu for information on the AzCam software used to operate most ITL cameras.

Shortcuts

Click the shortcuts below for instruments, be sure the expand the links (+ sign) next to an item at left.

- 90Prime
- BCSpec
- Mont4k
- MMT Red Channel
- MMT Blue Channel
- LBTGuiders
- VATT4k
- VATTSpec

- Click here for a PDF version of this entire site

Bok 2.3 m Telescope

The Bok telescope on Kitt Peak has the 90Prime prime focus imager, the B&C Spectrograph, and several Steward guider cameras.

- 90Prime 8kx8k mosaic of 4 4kx4k CCDs at prime focus
- Boller and Chivens Spectrograph with an 1200x800 pixel CCD
- Three Steward Guider cameras
    - 90PrimeGuider
    - BCSpec Guider
    - SPOLGuider

See the control room paper document for the Bok lightening shutdown procedure.

90Prime

90Prime is a prime focus wide-field imager for the Steward Observatory 90" telescope.

The documentation for 90Prime is now at https://lavinia.as.arizona.edu/~tscopewiki/doku.php?id=90prime_info.

BC Spectrograph

The B&C Spectrograph CCD was replaced with a newer version during summer downtime 2011. The new device has the same format but better performance.

Information

- Characterized 11Aug11 @ ITL
- Gain - 1.5 e/DN
- Noise » 2.7 e
- Full Well » 90,000 e unbinned
- Dark Current » 5.4 e/pixel/hour
- Operating CCD temperature: -120C
- HCTE (@1620 e): 0.999995
- VCTE (@1620 e): 0.999995
- ARC Gen1 camera controller
- Detector serial number - sn5812
- Pixels: 1200x800 15x15 microns
- Device type: STA0510A

Click this link for the ITL Detector test report, including QE curve

Kuiper 61 Telescope

The Kuiper 61' telescope on Mt. Bigelow has the Mont4k 4kx4k CCD imager as well as the bigguider Steward guide camera.

- Mont 4kx4k
- Guide camera (bigguider)

Mont4k

Information

- Characterized 07Aug13 @ ITL
- ARC Gen3 controller upgrade August, 2013
- Gain - 3.1 e-/DN (left) and 3.1 e-/DN (right)
- Noise - 5.0 e- (left) and 5.0 e- (right)
- Full Well
    - 81,000 e^- unbinned
    - 91,000 e^- binned 2x2
    - >200,000 e^- binned 3x3 (65k DN limited)
- Dark Current - 16.6 e-/pixel/hour
- Operating CCD temperature: -125C
- QE Curve
- ARC Gen3 camera controller
- Detector serial number - sn3088
- Photon Transfer Curves
    - Binned 2x2
    - Binned 3x3
    - Linearity 3x3
- Device type: Fairchild CCD486

- Pixels:4096x4096 15x15 microns

MMTO

The MMTO uses the following ITL cameras:

- Blue Channel Spectrograph
- Red Channel Spectrograph
- mmtguider guider

Red Channel Information

- IRAF detname: **mmtredchan**
- ~~CCD replaced in Red Channel dewar August, 2009~~
- CCD replaced in Red Channel dewar April, 2012
- Noise: ~4 e
- HCTE: ~1
- VCTE: ~1
- Dark current: < ? e/pix/hr
- Operating Temperature: -135 C
- Dewar hold time: ~11.5 hours
- Gain 2.5 e/DN or 1.2 e/DN
- CCD type: STA1759A, 100 um thick, fully depleted
- (additional device characterization required)

Blue Channel Information

- IRAF detname: **mmtbluechan**
- Characterized 10Aug06 @ ITL
- Gain: - 2.20 e^-/DN (gain=1) and 1.12 e^-/DN (gain=2)
- More Gain Info
- Noise ≈ 2.45 e^-
- Full Well ≈ 129,000 e^- unbinned
- Dark Current ≈ 2 e^-/pixel/hour, click for more dark current Info
- Operating CCD temperature: -135C
- QE Curve
- HCTE (@1620 e): 0.999995
- VCTE (@1620 e): 1.000000
- Photon transfer curves
    - Unbinned Low Gain
    - UnBinned High Gain
    - Binned 2x2 Low Gain
    - Binned 2x2 High Gain
    - Binned 3x3 Low Gain
    - Binned 3x3 High Gain
    - ARC Gen1 camera controller

- Device type: STA0520A
- Pixels: 2688x512 15x15 microns
- Detector serial number - sn3735
- This device was previous called ccd35
- Old detector info file

LBTO

LBTO on Mt. Graham uses the following ITL cameras on the PEPSI spectrograph and for guide cameras.

- LBT Guiders
- PEPSI Blue
- PEPSI Red

LBT Guiders

LBTGuiders

These are the guider cameras built at ITL for LBTO. All LBT guider cameras use the same CCD detectors and dewars. The software is based on the AzCam image acquistion system. The TEC cooled dewars are built at Steward Observatory. The detectors are E2V CCD57 devices.

AzCam Software

Go to this link to download AzCam software used in the lbtguiders systems.

Go to this link for lbtguider-specific software.

See Installation Notes for lbtguider specific instructions.

Wiring

Here are links to cable wiring drawings.

- Cable Wiring 1/3
- Cable Wiring 2/3
- Cable Wiring 3/3

PEPSI Guiders

PEPSIGuiders is the name originally given to the Magellan controller-based guider systems developed at ITL for AIP's PEPSI instrument. With the PEPSI integration activities at LBTO we no longer refer to the Magellan systems as PEPSIGuiders but refer to all guiders as "lbtguiders". The old PEPSI guider documents may be found here.

LBT Guider Upgrade 2009

In 2009 a new project was initiated to make several changes in the guider systems, initially for MODS. These changes are as follows:

1. Build and test two 3-m cables, flexible, with straight connectors for MODS.
2. Build and test two small PC's with SSDs, with 1 PCI board each from existing systems.
3. Upgrade AzCam software to new drivers with a parser which allows legacy commands from LBT control system.

4. Test and replace new flare fittings on MODS dewars to prevent possible coolant leakage.
5. Experiment with dewar back-fill using an insert gas to avoid yearly vacuum maintenance.

- Item 1 (cables). Two 3-meter cables have been completed and tested for an ARC controller and LBT guider camera. We actually measure slightly lower noise with these new longer cables. They are very flexible due to the silicone based insulation in the cables. We note that we do see pickup noise if the cables move during image readout. This is also true for the older cables, and is due to very slight capacitance changes in the cable during flexure. COMPLETE
- Item 2 (PC's). The solid state disks have been ordered and received. They have been installed in two test computers are found to operate AzCam very well. These disks are a viable option for LBT systems. COMPLETE
- Item 3 (Software). The new parser has been completed and tested. Pending tests are needed by LBTO to verify that the new method of data transfer over sockets is acceptable (sockets are opened and closed for each image in case of network failure). The new code also allows aborting an exposure from a Magellan controller. COMPLETE
- Item 4 (Fittings). Fitting have been installed on two LBT dewars. These fittings are acceptable to ITL for installation in other dewars. See this report for information on the retrofitting tests. As part of these tests we also verified the dewars are able to withstand 100 psi pressure for 24 hours. We found no problem with this pressure. COMPLETE
- Item 5 (back filling). We found an increase in detector temperatue of nearly 10 degrees C and so determined that back filling was not an optimal solution. COMPLETE

Installation Notes

LBTGuider installation Notes

See http://azcam.itl.arizona.edu/Installation.html for current AzCam installation instructions as well as links to the various installer files.

See http://cameras.itl.arizona.edu/LBTGuiders.html for general LBTGuider information, including links to the above AzCam site and to a copy of the lbtguiders code (as installed at *\AzCam\systems \lbtguiders)*, which will be referred to as the *lbtguiders folder*.

Version Configuration

New in December, 2013 are two configuration utilities (python scripts) which set the versions for *AzCamServer* and *ControllerServer*. These configuration utility files should be located in the *lbtguiders folder*. The files may be found at http://cameras.itl.arizona.edu/Files/LBTGuiders/Installers/lbtguiders/ and are called:

- AzCamServerConfigurationUtility.py
- ControllerServerConfigurationUtility.py

To set a specific version, run the appropriate script from File Explorer. The script will find the currently installed versions and present the user with a menu from which to select the desired version to use.

The AzCamServer utility overwrites a text file which is read when AzCamServer starts.

The ControllerServer utility is more complex. It stops *all* ControllerServers which may be running on the local machine, installs the version selected, and then starts that version. The ControllerServer

installation files must already be set up properly as per normal installation instructions (see http://azcam.itl.arizona.edu/ControllerServer.html).

PEPSI Red

Information

PEPSI Blue

Information

VATT

VATT on Mt. Graham uses the following ITL cameras:

- Vatt4k 4kx4k imager
- VattSpec spectrogreaph

Vatt4k

Lennon VATT4k Imager

- New STA0500A CCD installed September, 2007
- Characterized 17Oct08 @ ITL
- Gain info Fall 2011 PDF JPG
- Previous gain info
- Gain ~1.8 e/DN with gain setting of 2
- Noise - 3.5 e
- Full Well - 95,000 e unbinned
- Dark Current - < 20 e/pix/hr
- Operating CCD temperature: currently -118C
- QE curve PDF - TBD
- ARC Gen2 camera controller with dual output
- 50 second readout time
- Detector serial number - sn5348
- Pixels: 4064x4064 15x15 microns
- QE curve
- Old Gain Info (not current)
  - Gain report
  - vatt4K_2x2_DG2.gif
  - vatt4K_2x2_DG5.gif
- Lab PTC Report

VattSpec

Lennon VATT Spectrograph

- STA0520A CCD
- 2688x512 pixels, 15 microns
- ITL Serial Number 8228
- Detector operating temperature -110C
- Gain = 1.3 e/DN with setting 10

- Gain = 2.6 e/DN with setting 5
- For both gains the full well is ADC limited (65k DN), so this is 85,000 or 170,000 electrons.
- Noise is 3.4 electrons (3.2 in overscan region)

Steward Guiders

Bok guider for 90Prime - 90PrimeGuider

- Characterized 14Aug06 @ ITL
- Gain - 3.4 e/DN
- Noise - 12.9 3
- Full Well - 139,000 e unbinned
- Dark Current - 3.1 e/pixel/second
- Operating CCD temperature: -38C
- ARC Gen2 camera controller
- Guider dewar 1
- Detector serial number - sn2944
- Pixels: 512x512 15x15 microns
- Device type: 512FT

Bok guider for BCSpec - BokCassGuider

- Characterized 15Mar07 @ ITL
- Installed 18Mar07
- Gain - 3.1 e/DN
- Noise - 18 e
- Full Well - 76,000 e unbinned
- Dark Current - 4.5 e/pixel/second
- Operating CCD temperature: -37C
- Magellan/ITL camera controller
- Guider dewar 4
- Detector serial number - sn3010
- Pixels: 512x512 15x15 microns
- Device type: 512FT

Kuiper (61") guider - BigGuider

- Characterized 25Mar08 @ ITL
- Gain - 2.6 e-/DN
- Noise - 8.8 e-
- Full Well - 103,000 e- unbinned
- Dark Current - 126 e-/pixel/second
- Operating CCD temperature: -43C
- ITL/Magellan camera controller
- Guider dewar 11
- Detector serial number - sn4134
- Photon Transfer Curve unbinned

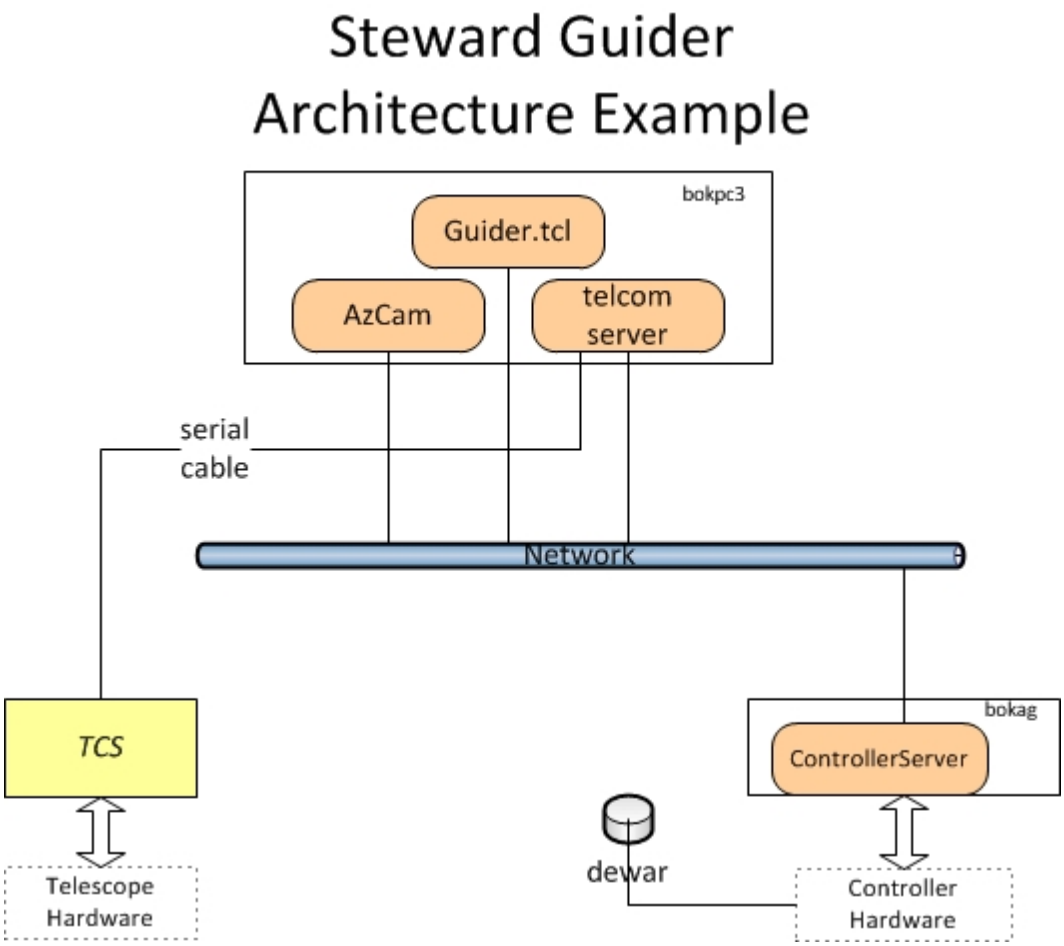
- Pixels: 512x512 15x15 microns
- Device type: MIT/LL CCID-37

MMT guider - MMTGuider

- Characterized 16Jun06 @ ITL
- Gain - 3.6 e/DN
- Noise - 5.3 e
- Full Well - 103,000 e unbinned
- Operating CCD temperature: -37 C
- ARC Gen3 camera controller
- Guider dewar 7
- Detector serial number - sn4135
- Pixels: 512x512 15x15 microns
- Device type: MIT/LL CCID37

SPOL guider - SPOLGuider

Architecture



ITL Guiders

This section contains technical information of ITL guider systems.

PC Setup

Notes for setting up a new PC for AzCam:

- Turn off firewall
- Turn off Windows update
- Perform all updates manually
- Make sure ControllerServer service is running
- Set IP address
- Check that the dewar temperature is read back from system and reads about 25 C at room temperature
- Check that ROI is set so there are no dark edges around the 512x512 image
- Copy PC code to backup site
- Enable remote Desktop Connection