M4K Operating Notes 12/1/17

Please note, this is not a guide for operating the Mont4k instrument, just the telescope operating system, for more details about the M4K, please go to:

- http://james.as.arizona.edu/~psmith/61inch/CCD/CCDmanual.html

To find an electronic copy go to:

- https://lavinia.as.arizona.edu/~tscopewiki/doku.php?id=kuiper:tcsng_operators_notes

Useful Weather Links

- Mt. Lemmon All Sky Camera-https://www.lpl.arizona.edu/~css/lemmon/
- Mt. Bigelow All Sky Camera-https://www.lpl.arizona.edu/~css/bigelow/
- Dark Sky Chart for Bigelow-http://www.cleardarksky.com/c/Kpr61AZkey.html?1
- Mt. Bigelow Weather-http://forecast.weather.gov/MapClick.php?lat=32.41507920800046&lon=-110.71453827399966&site=all&smap=1#.Wg8dSIhrzIV
- Atmospheric Sciences Weather Webpage-http://www.atmo.arizona.edu/?section=weather
- Atmospheric Sciences Arizona IR-http://www.atmo.arizona.edu/products/wximagery/azir.html
- Atmospheric Sciences Arizona Radar-http://www.atmo.arizona.edu/products/radar/radartus.html

Cold Start Power Up Sequence

1. UPS Room
    - Start UPS by following instructions on cork board
    - In UPS room plug in:
        - GPS (gray AC cord).
        - Emergency Stop Power 110 VAC (yellow plug)
2. In Dome
    - Check to see if any electronics are plugged into the east or west orange outlets on the base of the telescope. If so, make sure they are turned off.
    - Turn on Main Power.
    - Turn on Telescope Power.
    - Plug in associated power cables for instrumentation into orange outlets under scope if not plugged in already.
        1. M4K
            1. East Orange Outlet:
                - Camera power supply
                - Shutter power supply
            2. West orange outlet
                - Guider chiller
                - Power strip
        2. Turn on instrument
            1. M4K
                - Camera power supply

    - Shutter power supply
    - Power strip
    - Guider chiller
    - Guider/Filter wheel box
    - Guider power supply

- Turn TCS box on using the light switch next to the NG box on the East side of the yellow pier. This will be marked with neon green tape.
- If you're going to be operating from the dome using the laptop, plug in the laptop, turn it on, and sign in with the same password used on Gerard.

1. Control Room
    1. Plug in and turn on the following in the warm room:
        - The power strip on the west wall (includes new Dome TV Camera)
        - BIGAUX
        - All the monitors in the control room (BIGAUX, BIGCCD, Gerard, bigguider, and telescope camera monitor)
        - Laser printer
        - Plug in computer racks (orange outlet #4 on wall below emergency stop), and turn on the following computers as needed: Gerard, BigPOP, Telcom, bigguider, and bigCCD1.

Start of a Normal Night of Observing

1. Open all relevant weather websites on BigAux and verify safe observing conditions
2. Check the white board in the dome and make sure the last time the M4K was filled was under 24 hours ago. If it was filled over 24 hours ago, call Joe or Melanie for further instruction.
3. Walk the catwalk and verify safe observing conditions
4. Record opening time, wind speed, wind direction, temperature and humidity for trouble report
5. Make sure observing platform is down
6. Make sure the ladder, LN2 dewar, light over console, and anything else that the telescope/instrument could hit are all clearly out of the way
7. Verify mirror covers are closed
8. Separate upper and lower windscreens enough to see the dome shutter
9. Open dome shutter
10. Fully raise upper windscreen (or set to desired position)
11. Fully lower the lower windscreen (or set to desired position)
12. Open the primary mirror covers
13. Turn off all dome lights
14. Close door at top of stairs

Starting TCSng

1. Log into Gerard using the Kuiper password on the white board.
2. Open The Following Programs by double clicking on their icons
    - Safe Telescope Button
    - Paddle
    - INDI Server

- Xephem
  - Click “RT” button under looping if Xephem is not updating the time.
  - Click “View” and Select “Sky View”.
  - Click “Telescope” in Sky View and select INDI panel

3. In the “INDI Panel” window that opens connect to each of the following modules:
   1. Expand “TCS-NG-INDI”
      - Telemetry → Connection → On
      - Actions → Enable: this enables the telescope, and allows the focus and dome modules to update, as well as allows you to use the paddle on the bottom of the scope.
   2. Expand “Dome-NG-INDI”
      - Dome Control → Connection → On
   3. Expand “FOCUS-NG-INDI”
      - Focus Control→ Connection → On
   - You should now have information in each module updating regularly.
   - Please note that the order of the modules on the INDI Panel window changes randomly. For example TCS-NG-INDI may be listed first one time you use it and second or third another time.

Moving the Telescope

- **YOU MUST FIRST GO INTO THE DOME AND MAKE SURE IT IS CLEAR TO MOVE THE SCOPE (ladders out of the way, elevator down etc).**
- **For any move turn on the Dome Camera and watch the telescope until it gets to its target!**

- To Enable Telescope:
  - In Indi Control Panel:
  - Enter TCS-NG-INDI module
  - Telemetry
  - Actions
  - Click “Enable”
    - Note red light next to the Actions tab turns green.

- Ways to move:

1. With the Sky View window
   - Right click on the desired object.
   - Click Telescope GOTO
     - The Coordinates should populate in the NEXT section of TCS telemetry
   - Under “Actions” Click “Go Next”
     - Watch the telescope move in the Dome Camera!
2. Equatorial Coordinates
   - In Indi control Panel:
     - Under TCS-NG-INDI
     - GOTO Functions
     - Enter Desired RA, Dec and Epoch
     - Click click “set” or hit the enter key
     - Then under “Actions” “hit Go Next”
     - Watch the telescope move in the Dome Camera!

- When moving with the Sky View Window or Entering Equatorial coordinates, the telescope will

start tracking automatically.

1. Alt/Az coordinates:
    - In Indi Control Panel:
        - Under TCS-NG-INDI
        - GOTO Functions
        - Alt Az Goto
        - Enter the desired Altitude and Azimuth.
        - Click “Set” or hit the enter key.
        - Watch the telescope move in the dome camera
            - Note: the telescope will start moving after you clicking Set or hitting enter. There is no Go Next Button for Alt/Az postions

Stopping the Telescope (From the Control Room)

Three easy ways to stop the telescope when moving

1. Use the Large “Cancel” button from the “Safe Telescope Program”
2. In the “Indi Panel” window
    1. TCS Module
        - Telemetry → Actions → Cancel
3. Emergency Stop button mounted on north wall (last resort!)

Observing

- **Turn off the TV camera while observing. The camera uses IR LEDs which will interfere with the guider and science camera CCD's.**

Starting the programs needed for typical M4K use

- On Gerard
    1. Start dataserver, galilserver, and fw-gui in that order. When fw-gui comes up hit “read filter codes”. This can take a few minutes.
    2. Open ds9
    3. Open IRAF
    4. Start watcher
- On BigCCD1
    1. Start the Azcam program from the desktop icon
        1. Hit reset
        2. Change all the settings to what you want
- On Bigguider
    1. Start the guiding program from the desktop icon, and select the M4K guiding option.

1. Initializing
    - Send the scope to a bright star close to the zenith
    - Using the software paddle, center the star in the finder scope
    - Center the star in the science camera or guider.

    - In the “Actions” menu under TCS-NG-INDI Click “Init Next”.
    - **Don't Click “Init Commanded” unless you are a very experienced user!**
2. Focus
    - When starting up for the night it is usually a good idea to “Home” the focus
    - Under FOCUS-NG-INDI Homing and Focus Positions click home. The Focus position should decrease and you should see HOMING in the text box at the top of the panel. Eventually it will reach the home switch, stop moving and zero the focus position.
    - Use the other Focus Instrument buttons to move to a nominal focus position.
    - Use the Focus Position box to move the focus to a more precise position.
3. Limits:
    - Display The Limit Map:
        - In SkyView Window
            - Click “Control”
            - Click “Horizon”
            - Click “save”
            - click “close”
        - Time to event
            - If you want to know when a particular object is rising or setting:
                - Go to the Sky View window
                - Right click on your object and select “Telescope Go-To”
                - In the TCS-ng module, the very last thing in the “telemetry” tab is time to event. This will tell you how long until the object you selected will either rise above the limit so you can view it, or how long until it sets below the limit where you can no longer view it.

- Currently there is no indication (flashing, etc) on the TCS screen that you have hit a limit
- Software Limits
    1. North
        - 62 Degrees Declination
    2. South
        - 5 Degrees Elevation
    3. Horizon limits all the way around
        - 15 degrees Elevation, Hour angle=6 hours
- Confirmed with CJ 10/23/17

- Hardware Limits
    - North Limit ~62 degrees declination
    - South Slew Limit 10 degrees elevation (~-43 Dec)
    - South Hard Limit 5 degrees elevation (~-48 Dec)
- Catalogs
    - Selecting a catalog
        - In Xephem Main Window
            - Data
            - Files
                - The Files window will pop up you can add catalogs in the “Files” menu and remove them with the “Delete” button

- Catalogs in list form
    - In Xephem Main Window
    - Data Menu
    - Index
        - The Index window will pop up. You can select an object by name.

        - If you click Telescope GoTo the “Next” coordinates will be populated in the Indi Panel
        - You can then click Go Next To move to that object.
    - To use the search function you must type in the name of the object exactly or it will return no results.

- If you're using the laptop
    - Before you boot the computer, plug it into the network via ethernet. When it boots, it will then hopefully have the right time.
    - If it still does not have the right time, run the “Update time” program by double clicking the icon on the laptop's desktop.
    - There is now a safe telescope button you can bring up using an icon on the desktop

Operating From the Dome

1. You can use Xephem and the Indi Panel on the laptop to control dome and telescope. The laptop is currently being stored in the control room.
    - Note: you must have the Indi server running on Gerard to use the Indi Panel in the dome.
2. Hardware Paddle
    - The hardware paddle can control the dome, focus and telescope. The default guide and drift (2 and 40 arcsecs/sec)rates are very slow for telescope operation. You can change these values in the rates section of the Indi Panel.

End of Normal Night of Observing

1. Stow the telescope and dome
    - TCS-NG-INDI → Goto Functions → Stow
    - DOME-NG-INDI → Dome Actions → Stow
2. Disable the telescope: TCS-NG-INDI → Actions → Enable
    - Note: green light will turn red
3. Close the Mirror Cover
4. Close the Dome slit
5. Close the Wind Screens
6. Fill the dewar
7. Complete the trouble reports

Lightning Shutdown

1. “Complete Normal Night of observing shutdown”
2. In Dome
    - Turn off all instrument electronics, including the camera shutter, and unplug from orange outlets under scope (Four Cables)
    - If in use: shut down laptop computer, and unplug laptop and monitor from the orange UPS outlets located near the floor on the platform control console.
    - Turn off TCS computer using the light switch
    - Turn off Telescope power
    - Lower Platform

    - Turn off main power
3. In Control room
    - On BIGAUX double click “shutdown bigpop”, and click Shutdown bigpop when prompted
4. Manually shutdown all computers.
    - Gerard
    - BIGCCD
    - Bigguider
    - BIGAUX

- Turn Off printer.
    - Turn off Telcom server
    - Turn off and unplug power strip on west wall.
    - Unplug printer relay.
    - Unplug everything from orange outlets behind observer work station, as well as UPS outlets by the video finder scope monitor
    - Unplug computer racks (plugged into orange outlet #4 on wall below emergency stop)

1. In UPS Room, unplug:
    - GPS
    - Emergency Stop Power 110 VAC

- Shutdown UPS following instructions posted on board.

How to recover from Telcom issues

1. Close out guider software
2. Turn off all guider items (controller & chiller on telescope, bigguider in control room)
3. Flip power switch off on Telcom box and wait 2 minutes, flip back on
4. Type “telescope” in terminal window on Gerard to see if telemetry updates - if so
5. Restart all guiding items (bigguider in the control room, the chiller & controller on the telescope)
6. Wait for a minute and restart the guiding software on bigguider

Setting circles at stow

Dec:

RA: