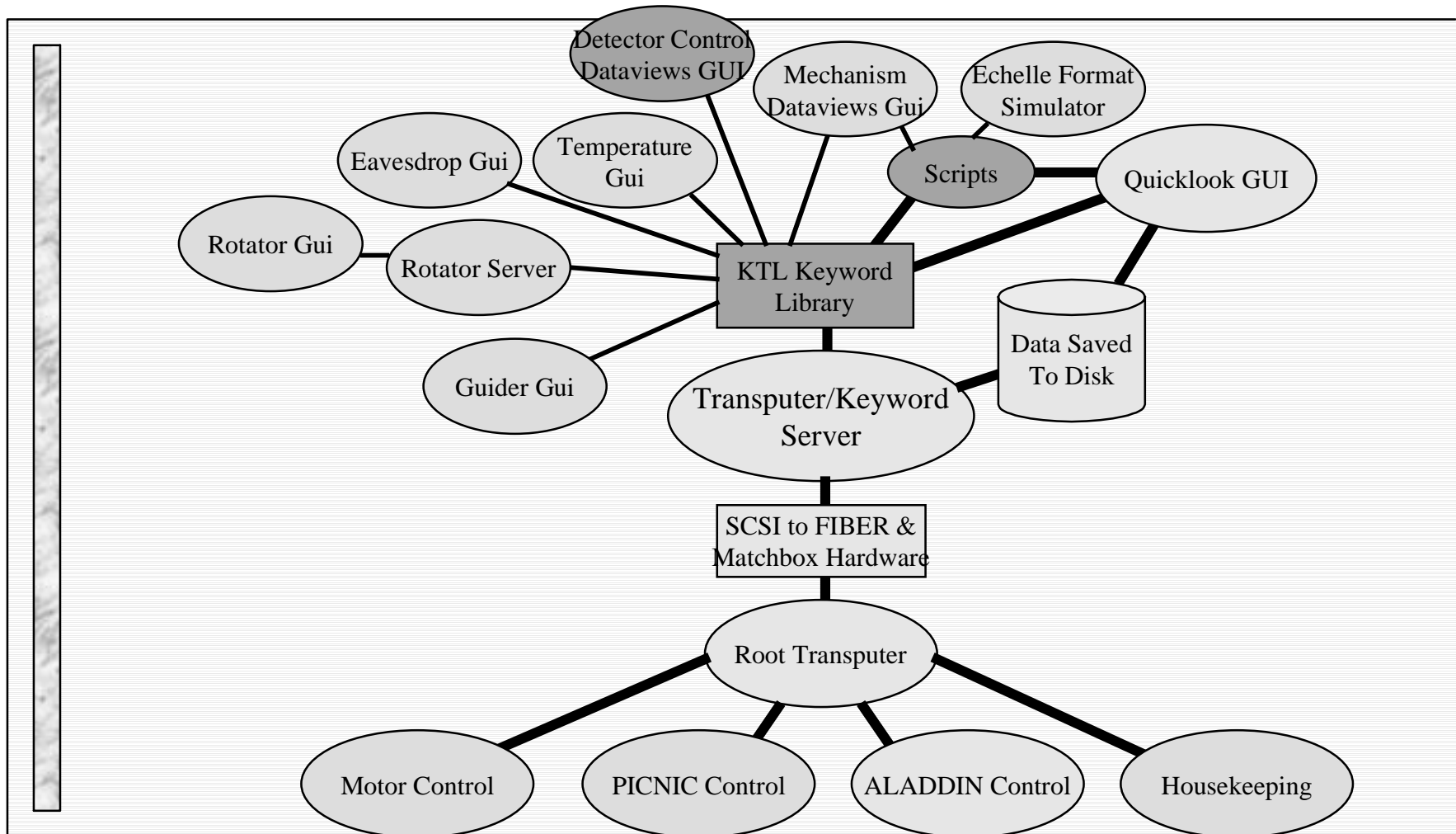




UCLA Software

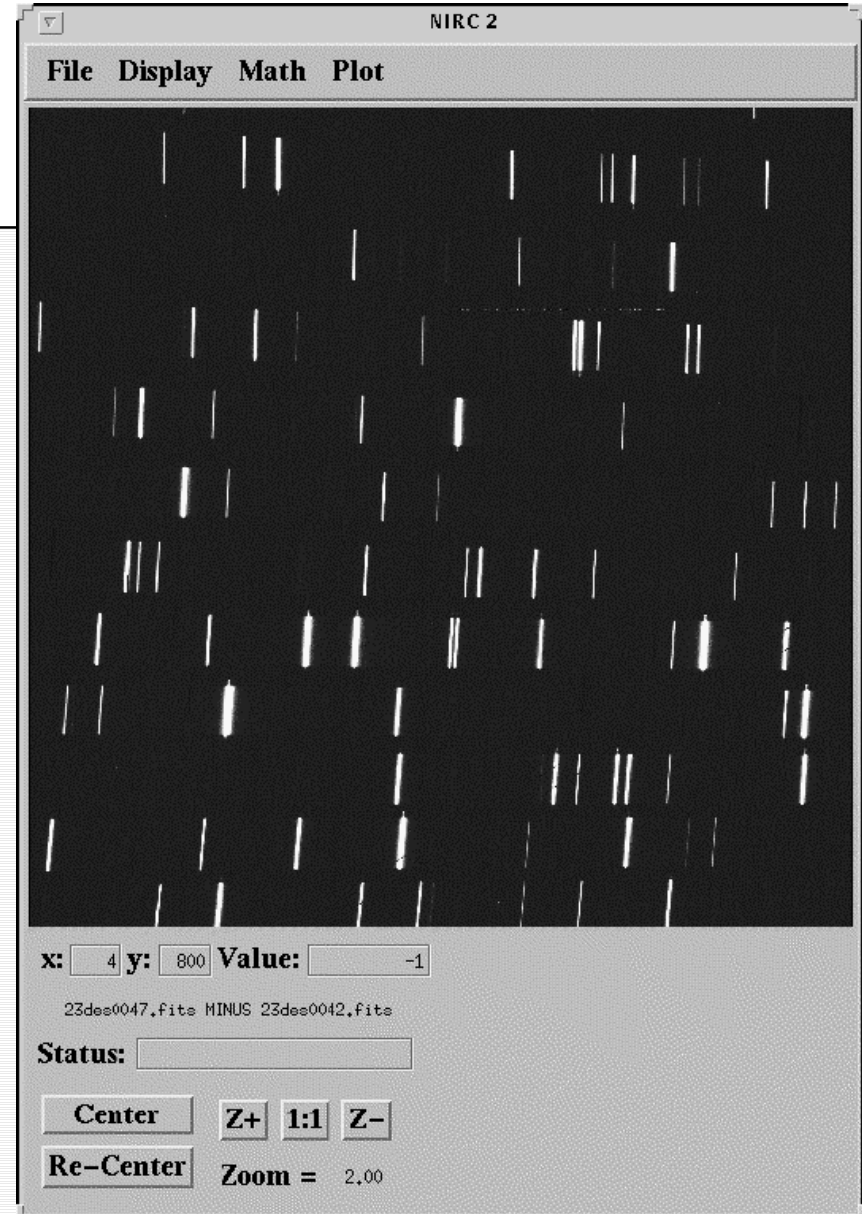
UCLA Astrophysics Laboratory NIRC2 Team
James Larkin, Ian McLean, George Brims,
Michael Spencer, Maryanne Anglonto, Gunnar
Skulason, Morning Roberts, Jason Weiss

NIRSPEC/NIRC2 Overview



Benefits

- ◆ Software Exists and is essentially complete.
- ◆ Fully integrated with ALADDIN electronics also being fabricated at UCLA.
- ◆ Identical to NIRSPEC -> Easier for CARA to maintain.



Benefits

- ◆ High level connection with Telescope DCS control program.
- ◆ Compatible with all CARA requirements.
- ◆ Easily expandable.

Electronics Capabilities

- ◆ 4 microsecond pixel rates => 0.131 sec full frame.
- ◆ Minimum CDS = 0.25 sec. Coadds require 0.1 sec.
- ◆ 5 Electron System Noise.
- ◆ Programmable Detector Bias and Preamp Offsets.

ALADDIN Software Capabilities

CURRENTLY:

- ◆ Three readout modes:
 - 1 Single Sample after reset (min = 0.25 sec).
 - 2 Correlated Double Sampling (min = 0.25 sec).
 - 3 Multiple Fowler Sampling.
- ◆ Up to 10,000 coadds (0.1 sec overhead).
- ◆ Frame download requires 5 seconds.
- ◆ Fits writing and copying requires 1 second.

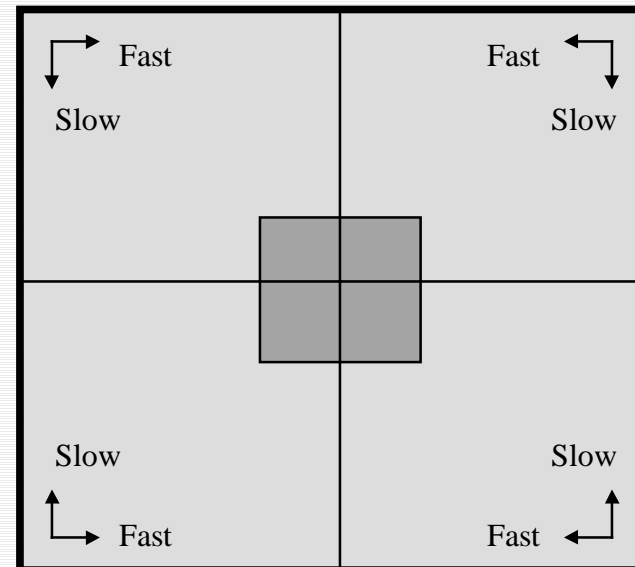
ALADDIN Software Capabilities

- ◆ Display requires less than 1 second.
- ◆ Individually set preamp voltage offsets for each detector quadrant.
- ◆ Complete Bias Control.
- ◆ Variable analog conversion rates.
- ◆ Variable electronic filtering.

UCLA Modifications

Subarray Clocking

- ◆ Centered square subarrays; multiples of 16 pixels
- ◆ Speed Improvements:
 - 512x512: 35 ms read time.
 - 256x256: 9 ms read time.
- ◆ What's Involved
 - Arbitrary clocking pattern
 - More complex packet sizes
 - More complex data arrangements



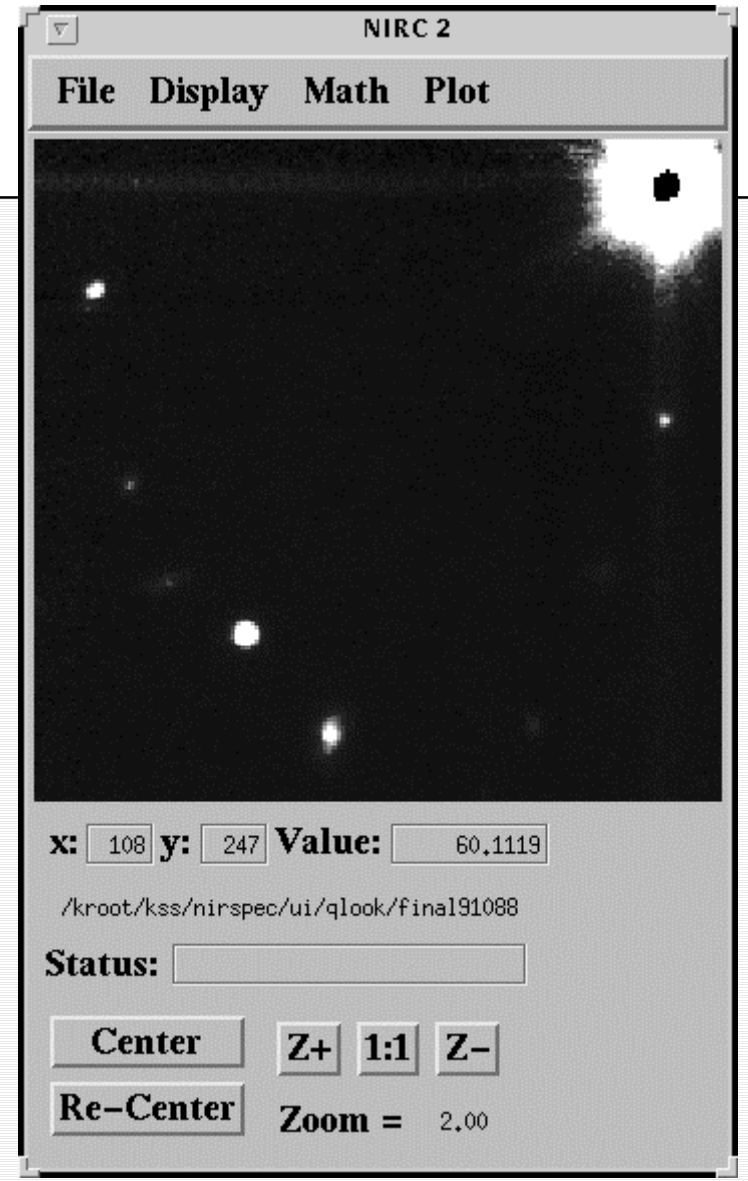
UCLA Modifications

ALADDIN 3 Multiplexer

- ◆ Last 6 devices of PAIDAI consortium have different multiplexer.
- ◆ Benefit: less odd-even row variations.
- ◆ Requires:
 - ◆ Overclocking of 2 quadrants.
 - ◆ Unscrambling last two rows of other quadrants.

Quicklook

- ◆ Full Function IDL Image Display and Analysis Package.
- ◆ Supports image arithmetic, photometry, spectral plots, surface plots, image statistics, zooming, Gaussian fitting, etc...
- ◆ Forms KIDL connection to server => auto display, display file, move telescope.



Expandability

◆ Based on KTL server.

- High Level Scripts.
- IDL interaction via KIDL.
- C based GUI with KTL.
- Full Connectivity to Telescope, AO system, and other KTL servers.

Snapi Script (csh)

```
#!/bin/csh -f
# Usage:      snapi
# Options:    none
# Note:       uses the node and nodn nirspec keywords for
#             nodding. It also copies its last file into
#             the /tmp/TEMPSKY2 file so the guider will
#             have a fresh sky frame.
# Purpose:    Take a scam image at the current position,
#             nod away by the amount specified by node and
#             nodn keywords in nirspec. Take a second
#             "sky" image and then nod back to the
#             original position.
# Created:    23oct98, James E. Larkin
# Modified:   18nov98, JEL for temp files.
#-----
modify -s nirspec comment2="Object image for snapi."
#start the first exposure at original location
#-----
modify -s nirspec go2=1
wfg2
#After exposure, move by node,nodn
#-----
set node = `show -terse -s nirspec node`
set nodn = `show -terse -s nirspec nodn`
modify -s dcs2 raoff=$node decoff=$nodn rel2curr=t
# Copy original file to temp location to prevent overwriting
#-----
cp /tmp/TEMPFITS2 /tmp/OLDTEMP

# Wait for telescope to settle, then take second exposure.
#-----
sleep 3
modify -s nirspec comment2="Sky image for snapi."
modify -s nirspec go2=1
wfg2
# Move the telescope back to original position
#-----
set tnode = `echo "0.0 - $node" | bc -l`
set tnodn = `echo "0.0 - $nodn" | bc -l`
modify -s dcs2 raoff=$tnode decoff=$tnodn rel2curr=t
# Set the display2 keyword to 0, so quicklook can see it.
#-----
modify -s nirspec display2=0
# Rearrange the images, and invoke IDL for subtraction.
#-----
cp /tmp/TEMPFITS2 /tmp/TEMPSKY2
cp /tmp/OLDTEMP /tmp/TEMPFITS2
setenv IDL_ARG1 "/tmp/TEMPFITS2"
setenv IDL_ARG2 "/tmp/TEMPSKY2"
echo "Invoking IDL for subtraction..."
/opt/local/rsi/idl_5/bin/idl
    /kroot/kss/nirspec/ui/idllib/sdiff
# Display the result and exit.
#-----
modify -s nirspec dispname2="/tmp/sdiff.fits"
modify -s nirspec display2=1
cp /kroot/kss/nirspec/ui/csh/sky.au /dev/audio
modify -s nirspec comment2="Sequence is complete."
```

Software Team

- ◆ George Brims - Wrote most of the existing Occam transputer code. Will write new clocking code.
- ◆ James Larkin - Written much of the high level code for NIRSPEC including quicklook. Will modify keyword library and quicklook for new clocking and array sizes.