KOSMOS Punchlist of known issues and items to address

Updated: November 5, 2021

Hardware issues:

1. shutter misbehaves in cold
   - workaround: switch to temp shutter now
     -status: installed and working (11/3/2021)
   - fix: replace with new shutter December/January
     - status: shutter has been ordered, has long lead time or 10 weeks.
2. slitviewer focus coarseness and backlash
   - workaround: use telescope focus
   - test: repeatability of tel focus offsets between slit positions
   - test: repeatability of trick using backlash
   - partial fix: microstepping to address coarseness (will still have trouble with backlash?)
     - status: spare motor controller on order will test software upgrades on it before adjusting instrument settings
       Estimated time of arrival 4-6 weeks
   - partial fix: reduce aperture to make field deeper?
   - partial fix: reduce magnification to increase FOV?
3. sag
   - workaround: tell observers to take cals at each position (oh boy, all the users make excuses not to...)
   - test: figure out which components are sagging (how?)
     -status: initial investigation found no loose or moving parts (wheels)
   - test: sag with different grism+slit combos
   - test: sag repeatability
   - fix: stiffen back end of instrument on truss?
   - fix: stiffen specific components?
4. bias/overscan issues
   - test: what causes biases level to wander? Ambient temp but also other?
   - test: CTI problem only when saturated? Or also mid-high count levels?
   - test: overscan begins at center of chip?
   - fix: change voltages? ... and then repeat how much of the commissioning process?
5. internal lamp illumination offset
   - test: confirm offset is repeatable? It seems to be.
   - partial fix: change illumination angle?
6. CCD temp regulation
   - deadband? PID loop?
   - Do we like 160 K?
   - monitor log vacuum pressures as well
7. slits tilted relative to rows on slitviewer
8. Need firmer numbers of readnoise, gain and linearity.
   - make measurements on telescope during the cloudy night or possibly daytime after have a reliable shutter.
   - proper photon transfer curves with truss lamps for readnoise, gain and linearity.
   - characterize dark current at different ccd temperatures (coincide with 6?)
9. Documentation / User Manual
   - It will not be long before users are asking for a User Manual. Something beyond the KOSMOS Quick Look Guide
   - Who is writing it? Will it conform to our format of other instrument manuals?
   - Russet/Bill write up wiki instructions based on low level software?
10. Spares
    - Diana has been given a list of parts to spare.
    - About 50- 75% of these spares have been delivered and are on site.
    - A Spares cabinet at the base of the telescope has been created as a localized storage spare for spares.
    - A Spares list exists in the documentation pile on Google Drive.

Software issues:

1. TUI pulldown menus
  - workaround: changing font size corrects inst-config and tertrot pulldowns
  - workaround limitation: changing font size does NOT fix Sec Focus stepsize, guider filters
  - workaround: for 10.14, changing font size fixes invisible buttons like Start/Pause/Stop/Abort
  - fix this issue and maybe we could have a beta version instead of alpha?
2. Slitmasks and improved guiding
  - Can't do boresight guiding on slit without them
  - do flatfields help (like dcam) or hurt (like ecam)?
  - slit positions change with rotation
  - slits change a LOT when kcamera focus moves - so don't move kcamera focus?
  - can not guide below the slit?
3. Pause/Stop/Abort
  - Test: does Pause/Resume affect shutter? Countdown? Header?
  - Workaround: Can abort exposures/sequences with ppxAbortexp followed by ICC restart
  - Fix: For EXPTIME and DARKTIME in headers, try for consistency with ARCTIC/DIS/echelle behavior
4. Bias/overscan section in headers
  - easy fix? Only four possibilities for four binning options, no subframes!
  - try for consistency with ARCTIC header cards
5. Too easy to leave lamps on
  - lamp status in warning color in config window if on, default color if off
  - calstage status in warning color in config window if in, default color if out
  - try for consistency with Echelle config window behavior
6. Imagetyp in header
  - set IMAGETYP to "comp" if [object or flat requested] and [calstage in] and [internal Ne, Ar, or Kr on]
  - set IMAGETYP to "comp" if [object or flat requested] and [calstage out] and [truss He, Ne, or Ar on]
  - set IMAGETYP to "flat" if [object requested] and [calstage in] and [internal Qtz on]
  - set IMAGETYP to "flat" if [object requested] and [calstage out] and [truss Qtz on]
  - try for consistency with DIS/Echelle header cards
8. Correct *SEC data and bias keywords in the fits headers
  - fix BSEC,CSEC,DSEC keywords for fits headers for 1x1,1x2,2x1 binning modes. Recommended change:

Note: "1x2" and "2x1" are particularly imprecise terms, because the kosmos TUI window puts row binning first and column binning second, while the headers describe column binning first and row binning second. That's how I made this mistake in the first place. Here I have the terminology so header matches header, but also hopefully it's clarified enough to translate to the TUI window. (Does this mean we should add changing the order of rows and columns in the TUI window to the punchlist?)

1x1 binning BINX = 1 BINY = 1
CSEC11 = '[1:1024,1:4096]' / data section of CCD (unbinned)
DSEC11 = '[1:1024,1:4096]' / data section of image (binned)
BSEC11 = '[2049:2098,1:4096]' / bias section of image (binned)
CSEC12 = '[1025:2048,1:4096]' / data section of CCD (unbinned)
DSEC12 = '[1025:2048,1:4096]' / data section of image (binned)
BSEC12 = '[2099:2148,1:4096]' / bias section of image (binned)

2x1 binning aka spatial binning; column binning = BINX = 2, row binning = BINY = 1
CSEC11 = '[1:1024,1:4096]' / data section of CCD (unbinned)
DSEC11 = '[1:1024,1:2048]' / data section of image (binned)
BSEC11 = '[2049:2098,1:2048]' / bias section of image (binned)
CSEC12 = '[1025:2048,1:4096]' / data section of CCD (unbinned)
DSEC12 = '[1025:2048,1:2048]' / data section of image (binned)
BSEC12 = '[2099:2148,1:2048]' / bias section of image (binned)

1x2 binning aka spectral binning; column binning = BINX = 1, row binning = BINY = 2
CSEC11 = '[1:1024,1:4096]' / data section of CCD (unbinned)
DSEC11 = '[1:512,1:4096]' / data section of image (binned)
BSEC11 = '[1025:1074,1:4096]' / bias section of image (binned)

CSEC12 = '[1025:2048,1:4096]' / data section of CCD (unbinned)
DSEC12 = '[513:1024,1:4096]' / data section of image (binned)
BSEC12 = '[1075:1124,1:4096]' / bias section of image (binned)

2x2 binning BINX = 2 BINY = 2
CSEC11 = '[1:1024,1:4096]'   / data section of CCD (unbinned)
DSEC11 = '[1:512,1:2048]'   / data section of image (binned)
BSEC11 = '[1025:1074,1:2048]' / bias section of image (binned)
CSEC12 = '[1025:2048,1:4096]' / data section of CCD (unbinned)
DSEC12 = '[513:1024,1:2048]' / data section of image (binned)
BSEC12 = '[1075:1124,1:2048]' / bias section of image (binned)

7. Kosmos TUI focus script?