

SWIFT commissioning progress

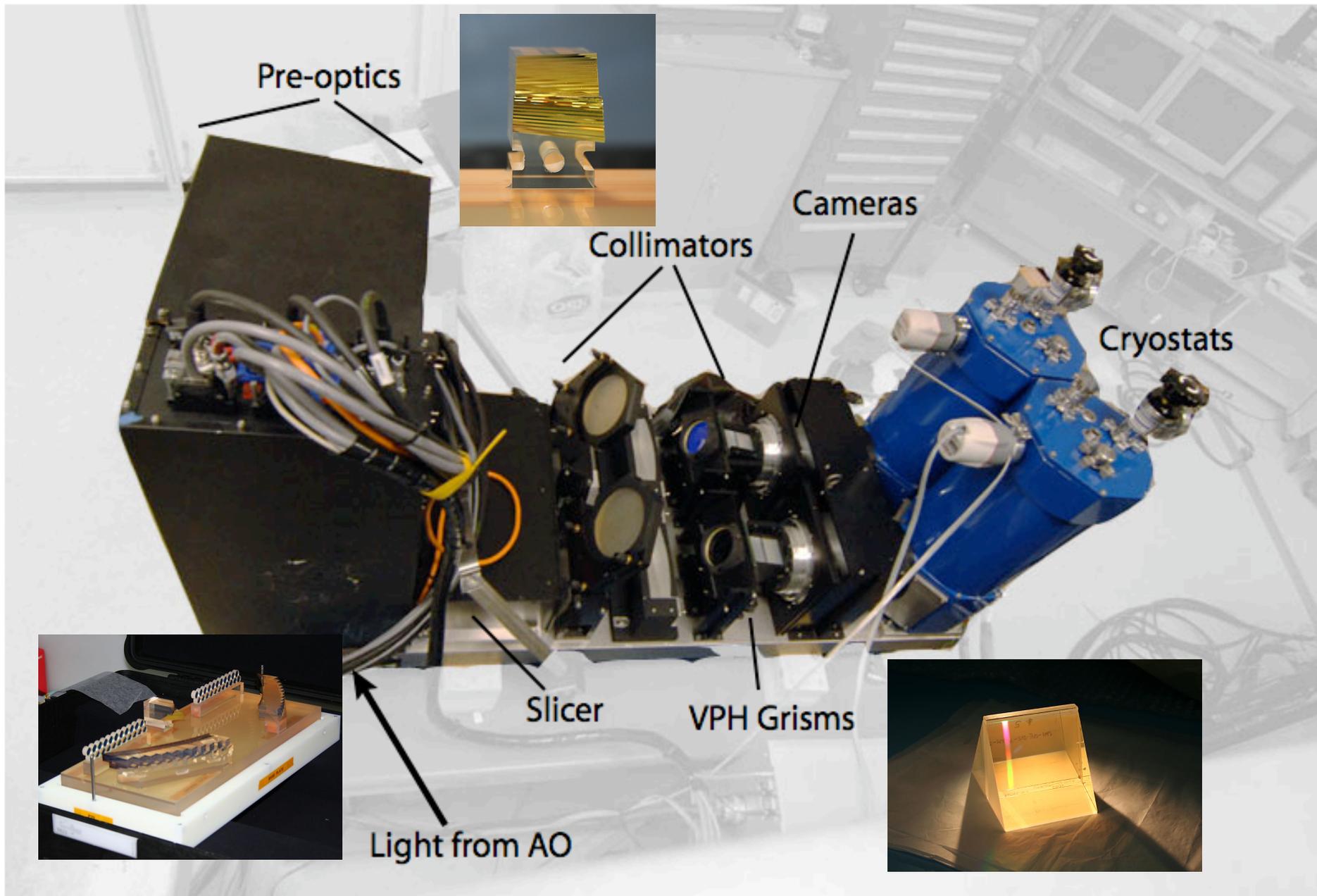
COO Council Meeting
29th September 2008

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Fogarty, Graeme Salter, Susan Kassin

Instrument overview

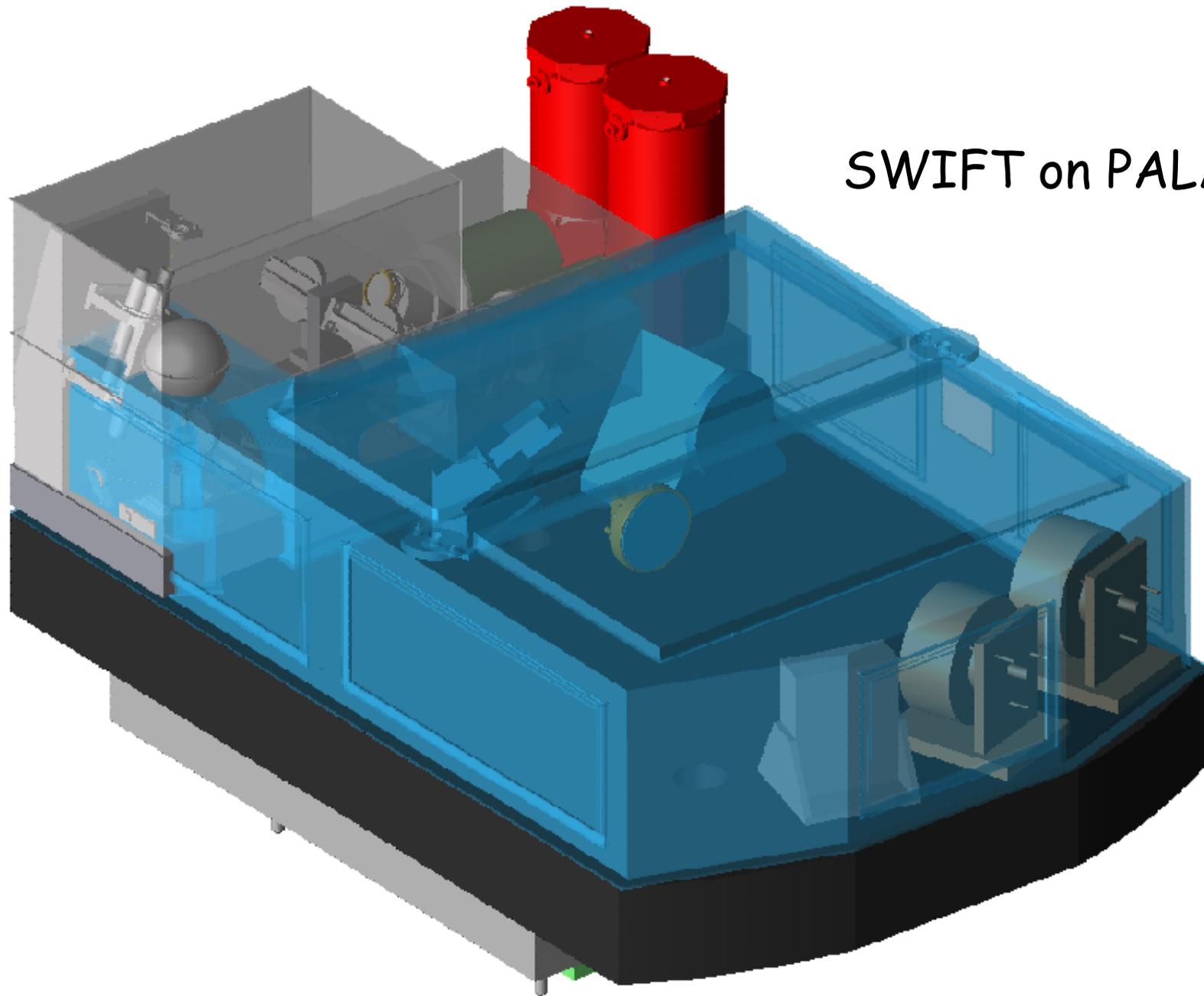
- I/z band integral field spectrograph mounted behind PALAO
 - Image slicer with 44x89 pixels
 - 0.235"/pixel giving 21x10" field of view
 - Also 0.165" and 0.080" pixel scales
 - Twin spectrographs after slicer
 - Fixed spectral format, 650-1020nm at $R \sim 4000$
 - Thick LBNL CCDs (2k x 4k) with $QE > 80\%$ at 950nm
- Yellow sheet on Palomar webpages



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SWIFT on PALAO

Key Science Cases (Oxford's drivers)

- Dynamics and Tully-Fisher in the redshift desert
 - No a-priori knowledge of dynamic axis required
 - Accurate slit placement not required
- Morphology & Dynamics of Ly- α emitters at $z=5-7$
 - Several Ly- α sources known to be spatially extended
 - Kinematics distinguish between infall and superwind outflow in Ly- α halos.
- SMBH masses with Ca triplet (PALM3K project)
 - Stellar dynamics of inner most regions of nearby galaxies => mass estimates for nuclear super-massive black holes

Other Science Cases

- Probing QSO lines of sight and their environments out to the highest redshifts
- Using strong gravitational lensing to study detailed morphology and kinematics of a few special objects at high redshifts
- Characterise stellar populations out to $z \sim 1$ (spatially resolved ages and metallicity) using well understood features (Mg b, H β , Fe), instead of bluer (less reliable) indicators
- H α morphology and kinematics of jets in young star forming regions, HH objects
- SNe (SNAP followup, removal of galaxy light)
- Brown dwarf companions (TiO, VO bands, NaI)

Project status

- Instrument arrived at Palomar on 17th September
 - Team arrived 22--26th September
- Currently finishing small electrical/mechanical jobs and testing instrument in the lab prior to fitting to PALAO
- Commissioning on sky 10-14th October
 - Officially 2 commissioning nights and two science nights
- Four nights scheduled in December and January for science observations;
 - Instrument team will attend these runs too.



Key Issues

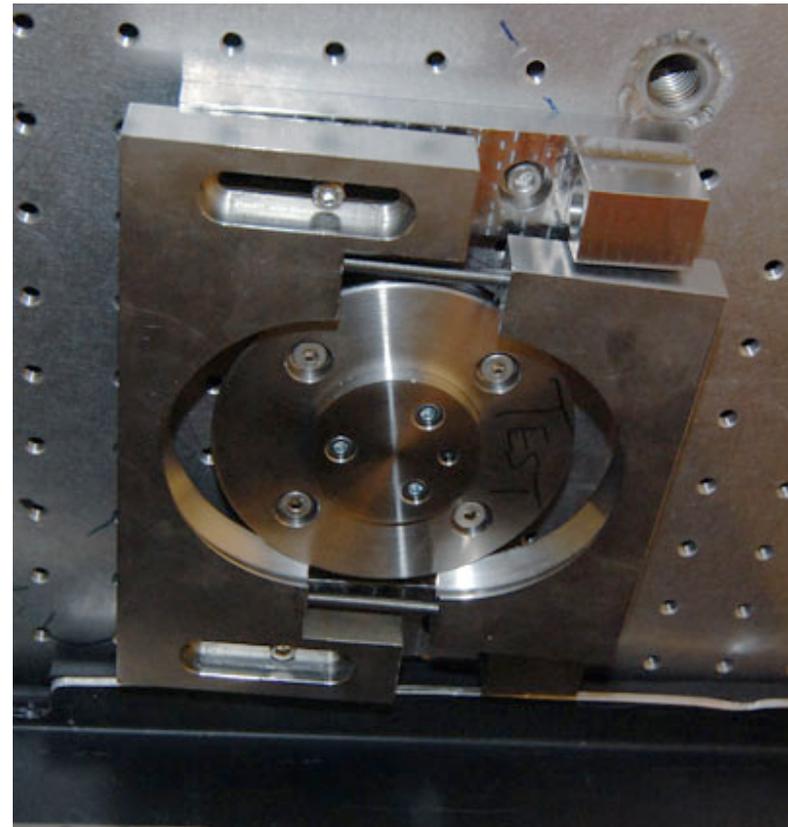
- Detector noise
 - Detector read noise is significantly higher than goal ($5e^-$)
 - currently producing around $20-30e^-$
 - Limits science capability, but does not affect ability to commission instrument on sky
 - Main source of noise seems to be high voltage bias board required to drive LBNL chips
 - Tim Goodsall will spend several weeks at Caltech after the commissioning run to work with Roger Smith/detector group on improving performance.
 - Will commission with 1 science grade and 1 engineering grade CCD.
 - December run will be with 2 science grades.

Key Issues

- Software
 - GUI control of all instrument functions
 - Not yet integrated into single OS GUI
 - Able to communicate with AO/TCS via ArcVIEW
 - Dual readout of CCDs possible with two computers
 - Not yet through ArcVIEW, but with development python system.
 - Image reconstruction software takes ~5s to make 2d image for acquisition
 - Still need to optimise reconstruction vectors from lab data
 - Data reduction pipeline based on SINFONI pipeline
 - Does not yet run automatically
 - Ryan Houghton arriving 2nd October to work on pipeline with instrument data
 - Aim to automate for at least "quality assessment" data reduction

Key Issues

- Optomechanical performance
 - Aim to test mount to AO bench on Tuesday (today)
 - Mounting system worked with P1640
 - Additional parts should make process easier than it was for P1640
 - Optical performance of spectrographs still to be characterized fully
 - Problem with camera image quality on 1 spectrograph (PSF \sim 3-5pixels); may need to reassemble camera
 - Detector tip-tilts need to be optimized
 - Cold adjustment which needs thermal cycle of cryostat to perform; minimum time \sim 12 hours.
 - Currently on 2nd iteration of tip-tilt adjustment - very close to optimal on one CCD already.



Mounting clamp hanging under AO system ready to accept instrument

Summary

- Instrument progressing well towards first light on October 10th
- Instrument and control system are fully operational, but several subsystems require improvement work to reach desired performance
 - Detectors
 - Control/Data reduction software
 - Camera Optics
 - Characterisation
- Aim to have "observatory level" instrument for 09A