Objectives of collaboration efforts between observatories

1. Reduce design risk by increased knowledge of problem.
2. Reduce cost of design through reusable subsystems.
3. Reduce time to first light through reusable design elements.
4. Increase maintain-ability through common knowledge on common systems.
5. Increase fraternity between observatories.

Generalities of the ING 'NIRCAM'

Imaging array will be a Rockwell HAWAII device. It is reported that significant fringing occurs in the array due to optical interference within the sapphire substrate. An earlier implementation (QUIRC) required the use of external FET amplifiers and current sources to minimise multiplexor glow. The second generation devices from Rockwell may have improved this. Pixel death caused by delamination of the detector to the mux by thermal cycling is minimised by slow cooldown / warmup procedures.
Information can be found at:-
http://www.risc.rockwell.com/
http://www.ifa.hawaii.edu/instrumentation/quirc/quirc.html
http://www.ifa.hawaii.edu/faculty/hora/

With 80% certainty, the detector controller will be the San Diego (Bob Leach) Phase II system bought "turn key" from IRLABS. Expected cost aprox. 25K pounds. This turnkey system will include the SDSU II controller, A VME based local controller with a SDSU Interface card, a software package running on a Solaris machine for detector control. Information regarding the SDSU controller can be found at
http://mintaka.sdsu.edu/ccdlab/

Cryopump will be a displacer type single stage CTI-CRYOGENICS Model 350 Cold Head. Expected minimum optics temperature aprox. 65K. The ING helium compressor system and plumbing will support this displacer. A spare (ex WHIRCAM) compressor will be on site. This may also be plumbed into the system allowing simultaneous cooldown or cold store on one instrument while another is on the sky. The detector will be fine temperature controlled using resistive heaters servo'd from the detector controller.

Cold stepper motors will be used for the filter wheels and pupil stop within the cryostat. The QUIRC instrument has suffered failures in the these devices with their design. The pupil view lens insertion will be done with a cold DC motor driving a lead screw into mechanical hard stops. The control for the functions will be from a VME system running VxWorks + EPICS and communicating via DRAMA across a network connection (75% certainty).

Areas of possible collaboration.

As with any intent to collaborate on projects the prime resource that can be of maximum benefit is *information.* It is through a **fluid and transparent flow of communication** that duality of effort and the risk within project development can be minimised. To this end, and as a first proposal, I recommend that the IAC, the ING, the RGO, and possibly the NOT observatories establish a common "group project area" using existing intranet technologies with an appropriate hierarchy for group interaction. For this to be successful each institute will need to discipline itself to using these tools. If this can be achieved, it will provide an added benefit in helping to organise and self document the project and instrument in one centralised repository.

Within this framework of information flow, and considering the project life cycle paths of the three infrared instruments, we can distinguish three broad definitions for the areas where collaboration can take place. These are:-

Design and construction effort (including user operating requirements).
Testing and commissioning feedback.
User data reduction and instrument optimisation.

Starting with the first, obvious areas for specific collaboration are:-

Optical design - Optical bench mounting, element materials, etc.
Mechanical design - Cold bearings, drives, antivibration mounts, etc.
Detector electronics design - systems, software, etc.
Detector characterisation - Common test and optimisation procedures.
Cryogenics design - Cryostat mounting, materials, components, heaters.
System control - Software tools and plateforms, user interface design, telescope interfaces, etc.

and obvious areas for instrument commonality are:-

Detector mounts and local electronics, connectors, etc.
Detector controller hardware and software.
Image acquisition hardware and software.
Motor drives and controllers.
Microcontroller hardware and software.
Cryogenic coolers, heaters, sorb pumps, insulation, vibration mounts, cryostat mounts, vacuum components.

Of course this list is not exhaustive. I would be very pleased to talk and work with anyone who feels that collaboration between our 'different' observatories can only lead to more science being achieved and this with higher quality.

User instrument requirements.

Please refer to http://ing.iac.es/~eng/instr/standards/inginst.htm for relevant requirements for instrumentation delivered as user instruments to the ING.

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