EXTERNAL INSTRUMENTATION PROJECTS AT THE AAO

Keith Taylor

As a partner to the AUSTRALIS consortium, the AAO (together with MSO and UNSW) is about to engage with ESO to build a fibre positioner for the VLT. This agreement (to be formalised, we hope, within the next few days) is the outcome of a combination of circumstances which began with the 1996 AUSTRALIS Concept Study for a Near-IR multi-object spectrograph for the VLT (Colless, Taylor et al) and ended with ESO deciding to develop a Wide-Field Fibre Facility FLAMES for their Unit 2 telescope. We hope, of course, that their decision to use AAO expertise was encouraged by our successes with the 2dF project and we see this new project as a way of capitalising on this huge investment — made possible only through the dedication and commitment of much of the observatory staff — to the benefit of ESO, AAO and the Australian astronomical community as a whole.

The OzPoz project (blame Keith Shortridge for the name) begins in earnest this month (April '98) and is to be complete by mid-2001. The fibre positioner, like 2dF, is double-buffered with a complement of 560 fibres per field-plate. Of these, initially 150 will be fed to ESO's GIRAFFE optical spectrograph (R<15,000) and 8 to the red arm of UVES (their high dispersion facility). Future projections have the remainder dedicated to a near-IR spectroscopic facility (R~8000) for the J and H bands. This latter spectrograph is inspired by the earlier AUSTRALIS concept design but, no doubt, will have evolved significantly from our original ideas — it is very much hoped that the Dutch will be a major collaborator in this next phase of FLAMES.

In addition to OzPoz, our major commitment, we are also involved in a variety of smaller design studies for external fibre-based projects. These include:

1) AUSTRALIS Phase A: Originally an out-growth of the concept study scoped to evolve the design of the positioner, spectrograph and "switchyard" (a sort of telephone exchange for fibres, acting as a convenient mode changer and re-formatter between the sky and spectrograph). The project has now moved to a proto-typing exercise for the most critical design areas with particular emphasis on the various IFU configurations and the switchyard itself.

2) FMOS design study: This is an Australia/UK collaboration (AAO, UNSW, IoA, Durham and Oxford) for an Optical + Near-IR fibre facility for the prime-focus of Subaru. The AAO is, predictably, taking on the challenging task of designing a 400-fibre positioner to work in the very confined space supplied by Subaru's f/2, 30arcmin field. A completely new positioner concept is necessary.

3) SOAR telescope IFU spectrograph: A small design study contract has been offered to the AAO to look into optimal IFU spectrograph strategies for the SOAR 4m telescope project. The challenge here is to supply very fine spatial sampling on this high image performance platform.

Of course these external projects will require us to recruit several new engineers and technicians (some are already in place). However these extra activities, together with our own very active in-house instrumentation program (IRIS2; WiFI; Controllers; SPIRAL), require us to be disciplined in our approach to project management which is why the Board has approved a new Project Manager position at its last meeting.

The underlying corporate strategy here is to actively engage with the larger telescope projects in the up-coming 8-metre era while maintaining a highly active in-house program. There is no doubt that the increased international contact this will give the AAO will act as a stimulus to our core business of running the AAT and UKST. We are committed to making sure that the external projects will not compromise our level of service to the UK/Australian astronomers. Indeed I am motivated by the belief that such external involvements will feed back into positive developments for our own instrumentation program. The goal is for all to benefit; ESO, Subaru and, of course, the UK/Australian community through a continued active, stimulating and creative AAO environment.

BOARD'S GREEN LIGHT FOR 6DF

Fred Watson

At its meeting in March, 1998, the Anglo-Australian Telescope Board considered the 6dF phase-A study document prepared by Stan Miziarski, Quentin Parker and Fred Watson. The document summarises the design work carried out to date on 6dF, the proposed robotic fibre positioner for the Schmidt Telesope, and presents a project plan for the completion of the instrument by the end of 1999. Board members also saw prototype models of the 6dF gripper and fibre retractors during their visit to Epping.

The Board had already considered the science case for 6dF at its previous meeting, and the prospect of an all-southern-sky galaxy redshift survey beginning early in 2000 convinced the members that the project to build

the instrument should go ahead. 6dF was therefore approved, subject to the outcome of a design review currently being carried out by Sam Barden (NOAO), Ian Parry (IoA) and Larry Ramsey (Penn State Uni). The review panel met in Hawaii during the SPIE instrumentation conference at the end of March, and its members are now preparing their report.

6dF represents a major advance over the existing FLAIR system, even with the upgrade to magnetic buttons now completed by Quentin Parker (see article on p. 13). Three new interchangeable fibre plateholders will be constructed, each having 150 self-retracting fibres arranged in a circle around the 6-degree field. This layout will allow 2dF fibre configuration algorithms to be adapted to 6dF. Fibre positioning will take place on the curved focal surface itself, rather than on a deformable flat plate as at present. This eliminates a source of delay in loading each configured plateholder into the telescope, but more importantly, it simplifies target acquisition once the telescope is on the field.

Positioning on a spherical surface dictates the use of an (r,θ) positioner rather than the (x,y) type used for 2dF. This will be fully robotic, and will make extensive use of air-bearings. The fibre gripper is a new design controlled and driven pneumatically; it, too, is supported on air bearings (see diagram on front cover).

The 6dF positioner will reside in an enclosure in the Schmidt dome to simplify transfer of configured field plates to the telescope and ensure that positioning and observing are, as far as possible, carried out with the field plate at the same temperature.

Target set-up time for 150 fibres is one hour, the minimum integration time currently used with FLAIR. Positioning time per fibre is therefore a fairly relaxed 24 seconds, easing the design of the system compared with 2dF. Nevertheless, the improved field turn-round time will increase the efficiency of the system for galaxy redshift surveys by a factor of up to ten compared with FLAIR. It will also do much to improve the state of mind of observers, who will no longer have to face the torments of AutoFred in the fibre-positioning lab.

Like the existing FLAIR plateholders, each 6dF fibre plateholder will have its own umbilical fibre cable attached, and these will be quickly interchangeable in the spectrograph. That instrument will remain essentially unchanged, although there are plans to upgrade the CCD detector.

The galaxy redshift survey itself will be of a near-infrared selected sample, and will be followed by a volume-limited sub-survey of rotation velocities and velocity dispersions for peculiar velocity measurement. Plans for the scientific administration of the surveys and the involvement of contributing partners are still to be finalised.

It is due to the efforts of a fairly large number of people that the 6dF project has succeeded in getting to its current healthy position. Among them are Peter Gillingham, Greg Smith, Lew Waller, Keith Shortridge and Keith Taylor on the technical side, and Matthew Colless, Gary Mamon, Will Saunders, Ken Wakamatsu and Ofer Lahav on the scientific side. They and the many others who have contributed are warmly thanked (and congratulated!) by the project team.

THE AAO/UKST H-ALPHA SURVEY

Quentin A Parker and Steve Phillipps (co-PIs)

The AAO/UKST Hα survey is now well underway with both 3 hour Hα films and associated short 15min TechPan R films being taken for each new 4^{o} field centre. The usually contemporaneous short reds have similar depth for point sources to the Hα exposures. Up to March 22nd we have taken 42 fields, representing 18% of the 233 fields in the survey region. At this rate we are on target to complete the survey within the 2–3 year timescale anticipated.

As expected, we are now making regular new discoveries from simple visual scans of the films where the superior resolution and good sensitivity combined with the excellent uniform coverage is paying handsome dividends compared with all previous UKST Hα (and other) photographic imaging performed over the last 20 years. Apart from proving to be a rich new vein of extended/evolved Galactic Planetary Nebulae (100 candidates so far from only 24 films scanned by QAP and MH – see last issue of Newsletter) we are also finding several new SuperNovae remnants. This includes the discovery of a 1^{o} across probable remnant that has just been confirmed as a real object with CTIO narrow-band imaging on the Curtis-Schmidt (which is equipped with a 1.15^{o} on a side 2K SITE thinned CCD). Several of our PNe candidates were also confirmed at CTIO, giving us high confidence in the veracity of our sample. Also more than 20 new Herbig-Haro type objects have been discovered from the first deep Hα film taken of the Orion region for Masheder et al. (see article by Mader et al. on p. 3 and picture on the back cover).

Clearly we are only at the tip of the iceberg. For example, recently acquired SuperCOSMOS data will reveal the true extent of the Hα emitting unresolved sources detected. Many of these may also be PNe