

Instrumentation Plans for the ING Telescopes

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Observational astronomy has entered a phase of rapid change. The advent of a new generation of large ground based optical and infra-red telescopes has opened up new exciting possibilities for astronomical research and already has had a profound impact on key areas of astronomical research. These new facilities imply a shift in scientific emphasis of the smaller telescopes. Equally important is the economic impact of these new facilities as resources will naturally flow towards the largest telescopes and consequently the operation and development programmes for small and medium size telescopes will be under more pressure. In these changing circumstances the existing telescopes at ING will have to find a new role for the future. This implies that the use of the telescopes and future development of new instruments will have to be tightly focussed on future needs of the astronomical community.

At ING, the resources available for operation and enhancements of the facilities have declined very substantially over the past six years. Moreover, the resources for operational activities will have to be reduced further in order to make sufficient funds available for development of new instruments. A focussed approach to operation and development of the telescopes is now even more important than before.

These and other issues related to the optimal exploitation of the facilities at the observatory on La Palma were subject of a three-day workshop held in Sheffield in April 1999.

Existing instrument suit

The current set of instruments on the telescopes at ING has been developed

over a period of approximately two decades. The WHT supports a wide variety of spectroscopic and imaging instruments. Currently on the WHT there are seven major common-user instruments, and there are a number of new developments on the horizon, such as an IR imager and a common-user adaptive optics system, which will broaden the capabilities of the WHT even further. Within the limited resources available for telescope operation it becomes ever more difficult to optimally support the growing number of instruments. Consequently, some instruments will have to be withdrawn from the pool of facility instruments.

The existing suite of instruments on the WHT can be separated into three classes:

- Workhorse instruments (ISIS medium resolution spectrograph, UES echelle spectrograph, and Prime Focus imaging unit) that cover a wide range of basic observing options. These instruments must be maintained and enhanced to retain their competitive status.
- Development instruments (AUTOFIB/WYFFOS fibre spectrograph, INGRID IR imager and NAOMI Adaptive Optics system). These instruments are novel and are still being developed and enhanced to provide cutting edge science capability.
- Niche instruments (TAURUS Fabry-Perot spectrograph and LDSS multi-object spectrograph) that provide very useful capability but serve a relatively small user group.

All instruments are competitive and enjoy a reasonable level of interest from the community. The three workhorse instruments are the most popular with users, and also produce

the bulk of the published papers. The newly developed instruments enjoy a still growing number of users, as one would expect. These instruments form also the key to the development programme on the WHT.

The two niche instruments, LDSS and TAURUS are used by a small but active and productive group of astronomers. Both instruments do fill a need in areas where they are still competitive. LDSS combines high throughput with the multiplex advantages of multi-slit spectroscopy, which is important for studies of densely packed clusters of stars or galaxies. TAURUS with its Fabry-Perot etalon imaging is a useful tool for studies of kinematics in nearby galaxies and nebulae. The recently developed tuneable narrow-band imaging mode for TAURUS offers a new and unique tool for a wide range of studies.

It was recently decided to stop offering the latter two instruments as common-user instruments in order to allow observatory staff to focus effort on a smaller number of instruments. An opportunity has been created for interested user groups to adopt and develop LDSS and TAURUS as private instruments. In this way it is hoped that through continued interest in these instruments they will remain available, albeit as private instruments fully supported by the interested user group.

Future role of the telescopes

The future development programme for the WHT will need to focus on specific target areas, taking into account the likely role of the telescope in the era of the 8-m class telescopes. These targets must concentrate on areas where 4-m class telescopes can remain competitive, either because medium size telescopes offer some unique advantage over the larger telescopes, or because these telescopes will provide the required observing time for larger scale projects (e.g. surveys and time dependent phenomena).

There will also be an important role for medium-sized telescopes to carry out observations in support of the largest telescopes, as target selection engines and other preparatory and follow-up observations. Such preparatory work will require substantial amounts of telescope time.

The areas for development identified for the WHT concentrate on high spatial resolution imaging and spectroscopy through adaptive optics, in particular at shorter wavelengths, and exploitation of the available wide field in the prime focus for spectroscopic purposes at visible and near IR wavelengths. Both these development areas will allow the WHT to remain competitive next to the larger telescopes.

Image quality is a decisive factor not only to resolve objects, but also to detect faint objects against the sky background or above the detector read noise. This is where the potentially great advantage of adaptive optics techniques comes in. With current technology and on a good observing site like La Palma, a 4-m class telescope is ideally placed to optimally exploit the techniques of wavefront correction to achieve an image quality much better than could be expected under even the best seeing conditions. The deployment of laser guide stars would provide an even bigger advantage, above all by dramatically increasing the sky coverage of the AO system. The ongoing

development of the NAOMI common-user adaptive optics system on the WHT is well placed to exploit this advantage for a wide variety of science projects.

Also in the area of wide-field observations 4-m class telescopes offer a capability that will not be available on larger telescopes and therefore this is seen as a key development area for the WHT. Various telescopes are already developing wide field optical and IR imaging facilities (e.g. CFHT, ESO-VST, NOAO, VISTA, UKIRT), and therefore the WHT is seen to concentrate on a complementary role by exploiting its wide field in the prime focus for spectroscopic observations. In the first instance, further development of the fibre fed WYFFOS spectrograph is seen as the natural route to exploit this area further. The immediate need for wide field imaging at the ING is covered by the Wide Field Camera on the INT and the existing prime focus imaging camera on the WHT.

In order to inspire new ideas for instrument developments for the WHT an Announcement of Opportunity was recently issued. It is anticipated that this announcement will inspire the next major common-user instrument, commensurate with the needs of the astronomical community.

Although the development programme for the WHT will necessarily be focussed, for the foreseeable future there will remain a strong need to

retain a relatively wide range of instruments on the WHT, allowing a variety of science objectives to be pursued. It is also expected that the WHT will remain an important platform for visiting instruments. These requirements imply that the level of engineering and astronomy support for the WHT needs to remain at a high level.

The role of the INT in the coming years will focus on the exploitation of the Wide Field Camera. Survey activities, both in support of observations on 8-m class telescopes as well as for science objectives in their own right are expected to become more important. The recently initiated survey activities on this telescope are a good example of this.

The operational support for the INT will reduce further. Recently, Telescope Operator support was withdrawn from the INT for some of the nights. The modernised control systems now allow easy and safe operation of the telescope and instruments by a single user.

Finally, no developments are envisaged for the JKT. Operational support will be at a minimum level. This telescope still provides a useful tool for photometric studies of various relatively bright objects, and serves as a useful training platform for students. ☐

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