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To: GMT High Dispersion Spectroscopy Workshop participants
Date: 19 April 07
Subject: Brief Workshop Summary and Action Items

I would like to thank all the contributors to the GMT High Dispersion Spectroscopy Workshop for their thought provoking presentations and all the workshop participants for contributing to a spirited discussion. The consensus opinion is that a GMT High Dispersion Optical Spectrograph will enable is profound, exciting and beautiful science. Most of these PowerPoint presentations can now be viewed at the access controlled pages at the GMT web site (www.gmto.org) under "meetings". Eli Slawson (slawson(at)ociw.edu) can provide you with access if you have lost his e-mail with the access information.

However, if we are going to be successful in proposing an instrument concept to the GMT consortium, we need do several things. We need to develop "killer apps" for the High Resolution Optical Spectrograph (HROS) – science cases where HROS crosses observational thresholds and opens up new discovery space that no existing or planned instrument for the 6.5-10M telescopes can access. We also need to get under one tent – our proposal must be for a single instrument, although that instrument will undoubtedly a multi-channel instrument.

The group is divided into several, sometimes overlapping yet competing, constituencies:

- Observers who want the broadest attainable spectral coverage.
- Observers who want extremely high resolution (R ~ 130,000)
- Observers that want multiplex advantage
- Observers who want the greatest achievable stability.

It is essential that we start a process to merge our requirements into a single list that allows us to develop an instrument concept that can be built for a reasonable cost, but is still exciting to the future users and the consortium as a whole.

As a first step, we have divided the discovery space into a list of subtopics that came up at the workshop. Several volunteers agreed to lead small groups to develop performance specifications HROS must meet to be useful for those observers. At this phase, the goal is

not to generate a self-consistent requirement document but rather assemble a complete requirement compilation. Hopefully we will achieve this synthesis in the next phase of this process.

For each science program listed below, we request the following information:

A. What resolution is required to achieve the science goals?
B. To what magnitude do you expect to work to? What signal-to-noise do you require at the faint limit? How long do you expect the integration will be?
C. What wavelength coverage is required? It is useful, even at this early phase, to try to divide this into requirements (must-have capability) and goals (desirable wavelength coverage).
D. Is Multi-Object (MOS) capability a requirement or extremely desirable? What sort of field of view is required for the MOS capability?
E. Is high stability a requirement? What stability is required and which is highly desirable?
F. Is direct feed required? Is fiber feed required?
G. Under the assumption that we cannot provide all the desired capabilities at first light, what is the rank order of instrumental capabilities HROS should have (Ultraviolet sensitivity, blue sensitivity, red sensitivity, near-IR sensitivity, MOS capability, high stability, high slit width-resolution product).

Items A – F above should be as much as possible scalar data, however it is important to justify these numbers. Please include a paragraph explaining how these numbers were arrived at, especially why the GMT will meet you science goals.

It is essential that we rationalize items A & B in terms of the expected slit width-resolution product, e.g. do you expect to reach the faintest objects with a resolution 130,000 at reasonable signal-to-noise? It is also important to explain what instrumental analogues you used to estimate the achievable performance of HROS, e.g. **N** hours of UVES achieved **X** S/N on a **Y** magnitude object. Given the diverse programs we are seeking to compare and merge, it is essential that we move our performance metrics to a "standard system".

It would also be useful to get a preliminary sense of how our community feels about a phased vs. a "one-shot" proposal. In the former case, we have more flexibility in the instrument concept, since we are less cost-constrained. As Pat McCarthy has pointed out this approach carries the risk that only the first phase will ever get built and we may never get the capabilities we thought were essential, but deferred to later phases of the program. In a "one-shot" approach we decide on a minimum spanning set of capabilities we can live with and propose everything for first light. This will require more compromise from the community and will maybe a less exciting proposal, but will eliminate the risk that some science will "never" get done at the GMT[1].

[1] "Never"= my lifetime.

The subtopic list and the individuals responsible for them are listed below. Some individuals were listed in absentia. Please contact me if you are unable to work on this now, and I will find a substitute.

We are hoping to get response in ~ a month, so I have 21 May 2007 as a deadline. We look forward to hearing from you soon.

Thanks you in advance for you help with this project.

GMT High Resolution Optical Spectrograph Science Programs

a. Local group dynamics – Mario Mateo (volunteered by Rebecca Bernstein)

b. Globular Clusters to Virgo – Andy McWilliam

c. Abundances in the Milky Way – Inese Ivans, Martin Asplund, Andy Mc William

d. Abundances beyond the Milky Way – Matthew Shetrone, Andy McWilliam, Inese Ivans

e. Intergalactic Medium Tomography – Pat McCarthy

f. Exoplanet discovery V < 10 - Dave Charbonneau, Bill Cochran, Dimitar Sasselov

g. Exoplanet masses (Earth) V < 14 – Dimitar Sasselov, Dave Charbonneau, Bill Cochran

h. Asteroseismology – Sylvain Korzennik

i. GAIA Synergy – Dimitar Sasselov

j. Exoplanet spectroscopy – Dave Charbonneau, Bill Cochran, Andrea Dupree

k. Isotopic abundance studies of Milky Way stars – Inese Ivans et al.

l. Abundance studies of special stars – Martin Asplund, et al.

m. Abundance studies of High Velocity Clouds – David Lambert volunteered someone?

n. QSO absorption systems – Pat McCarthy, Jill Bechtold and Xiaohui Fan (in absentia)

o. Reionization – Pat McCarthy and Xiaohui Fan (in absentia)