

- TMT -

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**IRMOS Feasibility Study
September 2005 Monthly Report**

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Abstract

Progress continues on the IOCDD and IFPRD deliverables. Preparations for TMT Week in Aspen, CO occupied the majority of several team members time during this month.

Revision Sheet

Release No.	Date	Revision Description
Rev. 1	10/12/05	Initial report by R. Dekany (delayed by attendance at TMT Week)

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1 GENERAL

1.1 Acronyms and Names

AO	Adaptive optics
CW	Continuous wave
DM	Deformable mirror
ELT	Extremely large telescope
FoV	Field of view (the field observed by a single detector array)
FoR	Field of regard (the field over which science objects may be selected)
FFPRD	Final IFPRD
FOCDD	Final IOCDD
FSR	Feasibility Study Report
FPRD	Functional and Performance Requirements Document
IFU	Integral field unit (a type of spectrograph)
IFPRD	Initial FPRD
IOCDD	Initial OCDD
IPT	Integrated product team
LAM	Laboratoire d'Astrophysique de Marseille
LGS	Laser guide star
MEMS	Micro-electro-mechanical systems
MCAO	Multi-conjugate AO
MOAO	Multi-object AO (having one DM per spectrograph)
Na	Sodium
NIR	Near infrared (typically 1-2.5 microns wavelength)
NSF	National Science Foundation
OCDD	Operation Concept Definition Document
PI	Principal Investigator
PDR	Preliminary design review
PSF	Point spread function
RMS (also rms)	Root mean-squared
SAC	Science advisory committee
SLGLAO	Single-laser Ground Layer Adaptive Optics
SRD	Science Requirements Document
TBD	To be determined
TBR	To be reviewed
TiPi	Name of Caltech's version of IRMOS
TMT	Thirty-Meter Telescope Observatory
TTF	Tip/Tilt and Focus
WFE	Wavefront error

1.2 Purpose

The purpose of this report is to document monthly activities accomplished toward the IRMOS Feasibility Study underway at Caltech.

1.3 Scope

This report covers the period August 16, 2005 to September 18, 2005.

1.4 Definitions

None.

1.5 Assumptions

None.

1.6 Related Documents

Caltech's IRMOS Feasibility Study web site at <http://www.astro.caltech.edu/oir/irmos>, which includes study deliverables and past monthly reports.

2 SCIENCE REQUIREMENTS DEFINITION

The science team has continued to progress with revisions to the IOCDD, including substantial new input of additional science cases for IRMOS.

In addition, we have begun definition of routine calibration and frequent on-sky observing procedures. These will be reported in the Final IOCDD. We have elected to call out in the IOCDD procedures by their frequency of expected occurrence (once-nightly, once-per-target-field, etc.).

2.1 SNR Estimator

We have continued to update our IRMOS SNR calculator to reflect the changing observational challenges presented by the science team. The latest version of this spreadsheet tool can be found at the IRMOS/TiPi web site referenced in Section 1.6, above.

2.2 Simulated PSFs

We have posted ensembles of the following PSF cases to our IRMOS/TiPi web site simulated PSFs:

- Seeing-limited
- Single-Laser GLAO
- Diffraction-limited
- (MOAO PSFs will be posted next month)

These are being extensively used by the science team (notably Jarle Brinchmann) to estimate performance toward key science objectives.

3 DESIGN ACTIVITIES

3.1 Dithering Analysis

This month, we have begun in-depth consideration of sub-Nyquist spectroscopic operation utilizing detector dithering. If successful, this technique could significantly reduce cost and

complexity of the individual spectrograph cameras. Our near-term goal is to understand this issue in light of the IFPRD.

3.2 Performance Budgets and Sky Coverage

We have established that the fraction of sky available for IRMOS/Tipi science, at the performance level specified in the SRD, is very high and meets the 90% goal at the galactic pole using low-risk technologies within NGS TTF wavefront sensors.

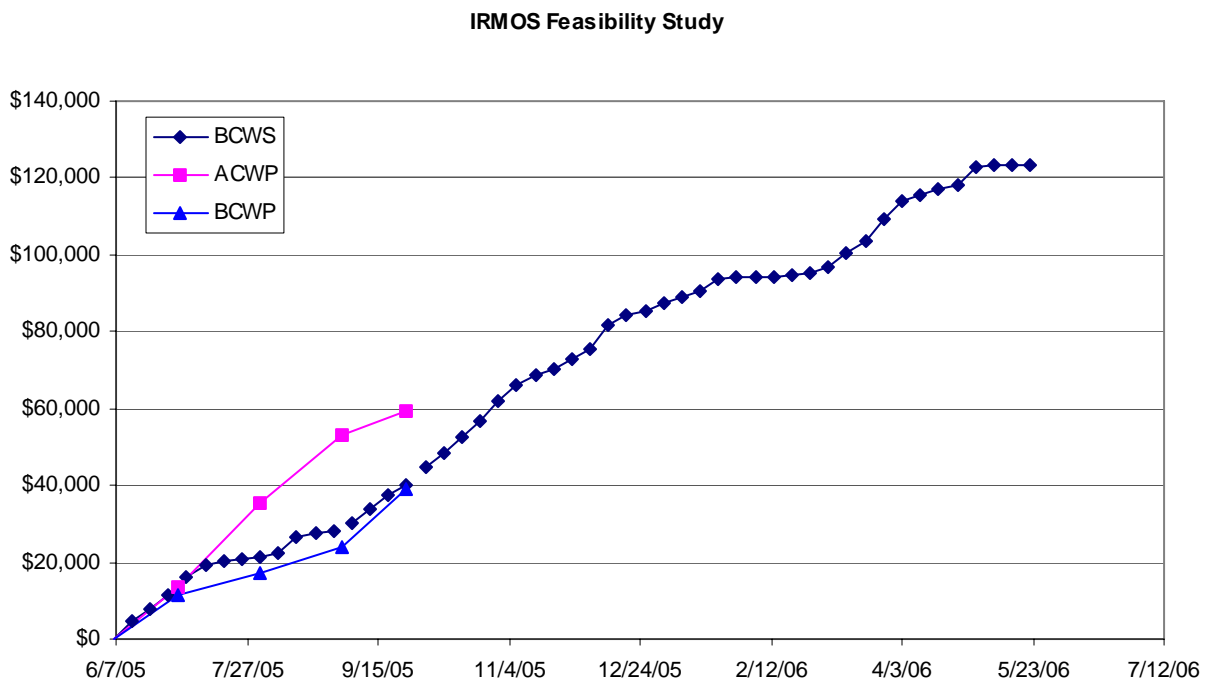
3.3 Other Design Issues

4 OBSERVATORY INTERFACES

No new work on Observatory Interfaces has been conducted in this period.

5 COSTS

5.1 Earned Value Analysis



As of 9/18/05, \$59,112 has been costed or committed under this contract. BCWP has begun to accelerate with the increased efficiency of the team, which is now fully up-to-speed on the technical issues. Cost Variance is beginning to narrow, but remains a concern in the near-term.

5.2 Construction Cost Targets

Ahead of schedule, we have begun estimating construction costs for various IRMOS options.

6 GOALS FOR NEXT TWO MONTHS

The project schedule calls for, in the coming two months:

1. Submission of the Final IOCDD and Initial IFPRD
2. Refinement of the optical design based on the IFPRD
3. Drafting of the FSR outline

Key questions being addressed in the next two months include:

- Performance estimation of MOAO, following the line of previous PSF-based simulations
- Science priority of 5' FoV vs. 2' FoV