Contents

- Project Overview
- Current Development
- New Project Manager
- Construction and Commissioning Phase Start

- LSST Status
Project Overview
GMT Overview

- **Optical Characteristics**
  - Seven 8.4m primary segments
    - Total diameter: 25.4m (area equiv. to 22m)
  - Seven 1.06m secondary segments
    - Total diameter: 3.2m
    - Fast Steering Mirrors & Adaptive Secondary Mirrors
  - Gregorian Focus
    - f/8, FOV ~ 20 arcmin

- **Alt-Azimuth Mount**

- **Dimension**
  - Height: 38.7m
  - Weight: 1,123 ton

- **Site**: Las Campanas Peak, Chile
GMT – Partners

- **U.S.A. – 7 institutions**
  - Carnegie Observatories
  - Harvard University
  - Smithsonian Institute
  - University of Arizona
  - University of Texas
  - Texas A&M University
  - Chicago University

- **Australia - national**
  - Australian National University
  - Astronomy Australia Limited

- **Korea - national**
  - KASI

- **Brazil**
  - FAPESP (San Paulo Research Foundation)
The Master Plan

- **1.** Enclosure
- **2.** Summit Utility Building
- **3.** Construction Offices & First Aid (During Const.)
- **4.** Warehouse / M1 Factory
- **5.** M2 Metrology
- **6.** Utilities / Shop Building
- **6.** Construction Camp / Future Lodge
Primary Mirror Status

Seven 8.4m diameter primary mirror segments
Six are off-axis – 14mm aspheric departure!

- S1 Complete – meets all contract specifications
- S2 Front surface processing
- S3 Rear surface processing
- S4 Cast Sept 18 - furnace will be opened in January
- S5 Glass in hand, mold material on order
- S6 Glass on order
Enclosure
Original

Summit Support Building
- Facility Building
- Auxiliary Building
- Equipment Building

Enclosure Building
- Enclosure
- Enclosure Base
- Telescope Pier
Enclosure Development

Enclosure Positions

- **Closed Position**
  - Moon Screen Closed
  - Wind Screen Closed

- **Open Position**
  - Moon Screen Open
  - Wind Screen Open
Enclosure Development

Enclosure Section / Perspective

- Ridge (64.0m)
- Catwalk (47.1m)
- Catwalk (37.0m)
- Catwalk (26.9m)
- Tel. Elevation Axis (22.5m)
- T.O. Ring Girder (16.8m)
- Observing Level (11.8m)
- Control Level (5.8m)
- Grade Level (0.0m)

1. Observing Chamber
2. Bi-parting Shutters
3. Moon Screen
4. Wind Screen
5. Observing Level Floor
6. Vestibule
7. Telescope Pier
8. M1 Coating
9. Mechanical Corridor
10. Vertical Circulation
Enclosure Development

Lower Enclosure Floor Plans

Grade Level

1. Entry & Circulation
2. Clean Room
3. Detector Lab
4. Coating Equipment
5. M1 Coating
6. M1 Wash / Strip
7. M1 Service Bay No. 1
8. M1 Service Bay No. 2
9. Vestibule
10. Instrument Bay No. 1

Control Level

11. Instrument Bay No. 2
12. Break Room
13. Electronics Room
14. Operations Room
Instruments
## Overview of the Program Elements

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Quick Status</th>
<th>Next “Event”</th>
</tr>
</thead>
<tbody>
<tr>
<td>G-CLEF</td>
<td>PDR completed Apr 8-10, 2015 Optics “Gate” Review passed Sep 29</td>
<td>Submit proposal for Critical Design Study</td>
</tr>
<tr>
<td>GMTIFS</td>
<td>Preliminary Design Phase: PDR late 2017 BSM prototyping; OIWFS prototyping</td>
<td>4th quarterly review Feb 2016</td>
</tr>
<tr>
<td>GMACS</td>
<td>Science requirements doc complete; SOW for Conceptual Design Both waiting for approval</td>
<td>Conceptual re-design start: January 2016</td>
</tr>
<tr>
<td>GMTNIRS</td>
<td>JHK gratings are advancing well</td>
<td>Science Workshop? May 2016</td>
</tr>
<tr>
<td>MANIFEST</td>
<td>Feasibility studies complete TAIPAN testing nearing completion</td>
<td>Annual status visit Feb 2016</td>
</tr>
<tr>
<td>Com Cam</td>
<td>SOW for Conceptual Design waiting for approval</td>
<td>Issue RFP for conceptual design: ASAP</td>
</tr>
</tbody>
</table>

Slides from G. Jacoby
G-CLEF – PDR April 8-10, 2015

- Great panel, offered many extremely beneficial suggestions for improving instrument
  - Optical design was flawed – moderate re-design nearly complete
  - Camera designs non-optimal – re-design far along
  - Other smaller issues identified – G-CLEF team working through
  - Mechanical and thermal design very good

- “Lessons learned” for future subsystem PDRs (28 elements available in GMT tech note)
Science Requirements Document complete – distributed for internal approval

Statement of Work (SOW) for conceptual design complete – distributed for internal approval (Oct 13) in preparation for RFP

- **SOW requests design study for two-channel optical MOS; no J-band**
  - Alternative IR instrument options under study (FIRE, GMTNIRS-NS)
  - Non-convergence on magnitude of J-band risks
  - Cost pressure
  - Time pressure
“The SAC notes that the IDAP process took place before the staged development process was implemented. As a consequence, the current first-light instrumentation does not permit any observations at near-IR wavelengths. The SAC regards this as a serious scientific deficiency and recommends that the Project explore pathways to deliver a simple near-IR spectroscopic capability at first light.”
FSM Development
Secondary Mirror Assemblies

ASM assembly
- MMT, LBT, Magellan, VLT heritage
- Natural seeing and all AO operation
  - Interchangeable top frames
  - Common optical prescription
  - Seven 1.1 m segments
  - Individual segment positioning & tip/tilt control

FSM assembly
- Magellan heritage
- Commissioning & ASM backup
KASI and GMTO Team Collaborating on FSM Development Plan
MOU signed in late July!
Current work and plan (led by S.H. Lee)

- **Phase 0 study**
  - Define scope of work, schedule and cost estimation
  - GMTO-KASI team work during Oct. 1\textsuperscript{st} 2015 ~ Feb. 28\textsuperscript{th} 2016

- **Phase 1 study**
  - Preliminary design for full FSM system
  - Expected to begin on May 1\textsuperscript{st} 2016.
New Project Manager
JAMES FANSON APPOINTED AS GMT PROJECT MANAGER

POSTED ON DECEMBER 9, 2015

Pasadena, CA – The Giant Magellan Telescope Organization (GMTO) announces the appointment of Dr. James Fanson as Project Manager. The GMTO conducted an international search to identify candidates for this position, and Dr. Fanson stood out in a field of accomplished project managers.

Dr. Fanson has held multiple positions at NASA’s Jet Propulsion Laboratory (JPL) since he joined the organization in 1986. He served as Project Manager for GALEX (Galaxy Evolution Explorer), Kepler, and the Keck Interferometer. In addition, he held key technical and managerial roles for the Spitzer Space Telescope, Hubble Space Telescope’s Wide-Field Planetary Camera 2, and other missions.

A collaboration of eleven international research institutions, the Giant Magellan Telescope Organization is set to build one of the world’s largest astronomical telescopes. As Project Manager, Dr. Fanson is responsible for leading the team of engineers, managers and scientists in turning this ambitious goal into reality.

“The opportunity to contribute to such an historic endeavor occurs perhaps once in a lifetime,” says Fanson. “The GMT is a great engineering challenge that will help us answer questions about the history, structure, and workings of the universe that are beyond the reach of the current generation of telescopes.”

The stars and the Milky Way piqued Fanson’s interest at an early age as he was growing up in Wisconsin. He recalls carrying his father’s telescope out to his backyard to observe the moons of Jupiter and other celestial objects. As he grew older, he biked to astronomy club meetings of the Milwaukee Astronomical Society, a group that has been together since 1932. Dr. Fanson went on to earn a B.S. degree in Engineering Mechanics at the University of Wisconsin and a doctorate in Applied Mechanics from the California Institute of Technology before joining NASA’s Jet Propulsion Laboratory.
Construction and Commissioning Phase
Construction Announcement

GIANT MAGELLAN TELESCOPE’S INTERNATIONAL PARTNERS APPROVE START OF CONSTRUCTION PHASE
The Giant Magellan Telescope’s international partners aligned to distribute a seamless global announcement of the organization’s plans to begin construction of the world’s largest optical telescope. Through our joint media outreach efforts we were able to secure broadcast, radio and online media coverage around the world resulting in over 245 million impressions. Our partner institutions also banded together on social media to drive the conversation around the announcement on outlets such as Facebook, YouTube and Twitter where the news received over 3.1 million impressions.

RESULTS

245+ million media impressions

Over 100 global pieces of unique coverage

3.1+ million social impressions across 3 channels
GMT Groundbreaking Ceremony, Nov. 11, 2015.
Large Synoptic Survey Telescope
KPG Participation in LSST Operation

2011

- Nov. 7. : first email request from LSST (Tyson)
- Nov. 11. : circulation to SSG members
- Nov. 25. : discussion at K-GMT SIWG
- Dec. 3. : CBP identified 6 PI’s interested in LSST
- Dec. 6. : BGP met LSST people at NOAO
- Dec. 9. : BGP reported at SSG about the discussion
- Dec. ? : Named Korean group as Korean Participation Group
- Dec. 30. : sent draft LOI (unsigned) to LSST

2012

- Jan. 17. : BGP met LSST people at NOAO
- Jan 31. : sent final LOI (signed) to LSST
Korea Astronomy and Space Science Institute

Dr. Sidney Wolff, President
Lasallian Institute
933 N. Cherry Avenue,
Tucson, AZ 85721-2209
U.S.A.

Dear Dr. Sidney Wolff,

As the president of Korea Astronomy and Space Science Institute (KASI), which is the representing institution of recently composed ad-hoc group of Korean astronomers named Korean Participation Group (KPG) for Large Synoptic Survey Telescope (LSST) project, I am writing this letter in order to show the intention of the KPG to join the research and development efforts of the technical and scientific aspects of the LSST project which eventually will lead to participation in the operation of the LSST.

Since 2009, Korea is participating in the Giant Magellan Telescope (GMT) Project, and KASI is representing Korea for this project. I anticipate a great leap of national research level from this enthusiastic project and the Korean astronomical community is eager to increase scientific capacity of the younger generation by providing them with chances to have access to intermediate to large telescopes until and after the GMT is commissioned. In order to maximize the output from the GMT we do need to have access to a huge amount of data produced from large survey projects such as the LSST. Selected sets of such data will be used as target lists for follow-up observations for further discovery of astronomical phenomena, not to speak of the value of the data itself.

In view of this, I congratulate you on your successful passage of recent NSF Preliminary Design Review and DOE CD-I review, and I understand that US funding agencies are poised to approve the construction budget for the LSST observatory with a schedule that would see full scientific operation being around 2020. I understand also that you are seeking contributions totaling ~$10 million per year towards the cost of operating the LSST Observatory from international sources beyond US federal agencies. I also understand that your current model envisages institutions contributing ~$20,000 per year per named PI during the planned survey period of 2020-2030 in return for full scientific involvement in LSST.

This is good news for the Korean astronomers who strive to promote themselves to obtain the best output from the GMT with the sympathy of participation in LSST. The Korean astronomical community is eager to be fully involved in the development and scientific exploitation of the rich dataset that will be generated by LSST. At a couple of meetings and polls amongst the Korean astronomers recently conducted, a total of eleven astronomers who are willing to contribute to the project over the next several years gather and compose a group with a name KPG. Since the majority of the members of the group are KASI researchers and KASI is the only astronomical institution funded by the government in Korea, I decide to represent this group too. I would expect that our level of involvement would increase during the operation and data exploitation phase (2020-2030). It is difficult to anticipate in advance how many PIs would comprise, as it will depend on the scientific orientation of the Korean astronomical community in a decade's time, and the ultimate cost per PI and the terms of the participation. However, for planning purposes, I would expect a total of 20 to 25 including the number of current members in the KPG would participate actively before 2020. I believe that the KPG members have expertise to offer to the project, both on the scientific and technological side such as data processing and analysis. Some of them have long been involved in the SDSS project and other survey projects and I believe they have a good ability to contribute to the R&D of the LSST.

I wish you a success in getting construction budget from your funding agencies and look forward to productive collaboration during R&D phase as well as operational phase in 2020-2030.

Sincerely yours,

Pil-Ho Park
President
Korea Astronomy and Space Science Institute

On behalf of the Korean Participation Group for LSST (KPG) consisting of:

Dr. Yong-Ik Byun, Yonsei University
Dr. Yum-Young Choi, Kyung Hee University
Dr. Myungshin Im, Seoul National University
Dr. Sung Chul Kim, Korea Astronomy and Space Science Institute
Dr. Joon Hyoep Lee, Korea Astronomy and Space Science Institute
Dr. Myung Gyeon Lee, Seoul National University
Dr. Byung-Gon Park, Korea Astronomy and Space Science Institute
Dr. Changhoon Park, Korea Institute of Advanced Study
Dr. Chang Hee Ree, Korea Astronomy and Space Science Institute
Dr. Yong-Seon Song, Korea Astronomy and Space Science Institute
Dr. Eun-Chang Sung, Korea Astronomy and Space Science Institute

(in the alphabetical order of last names)

CC: Dr. Anthony Tyson, LSST Director
CC: Dr. Donald Sweeney, LSST Project Manager
CC: Dr. Ho-Il Kim, Director, Optical Astronomy Division, KASI
CC: Dr. Byung-Gon Park, Manager, Optical Telescope Project Center, KASI
Activities until 2014

2013
- May 16th: LOI to MOA negotiation letter from LSST
- Jul. 3rd: Circulated May 16th document to KPG members
- (Questionnaires to be filled by the end of July)
- Jul 26th: Sent out the answers to the questionnaires

2014
- Feb 8th: Template MOA draft document received
- Mar. 27th: KASI internal review for the MOA draft done
- May 9th: Circulated draft MOA to KPG members
- May 12th: Finally revised draft MOA is saved
Action needed

- **Official organization of the KPG for LSST**
  - Identify real members of the KPG among 11 LOI members +/- people who really want to join.
  - Sign MOU among institutions which real members affiliate
- **Final revision of the MOA draft**
- **Sign and execute MOA**
Activities in 2015 until present

- **2015**
  - Jun 12th: Status report for KASI researchers
  - Aug. 19th: Formed a working group for signing MOA
    - Byeong-Gon Park, Hong-Gyu Moon, Arman Shafieloo, Min-Su Shin, Kyoung-Suk Lee

- **2016**
  - Feb. 1st: Almost Final version of the MOA is drafted.

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**Workshop: Next Generation Sky Surveys and Big Data**

Dates: **Apr. 25. – 29., 2016**

Venue: **KASI**

SOC: Arman Shafieloo, Min-Su Shin, James Jee, Alex Kim, and Eric Linder

Confirmed foreign key speakers: Elise Jennings, Steve Kahn (LSST director), Alex Kim, Eric Linder, Ashish Mahabal, Beth Willman (LSST deputy director), and Hu Zhan.