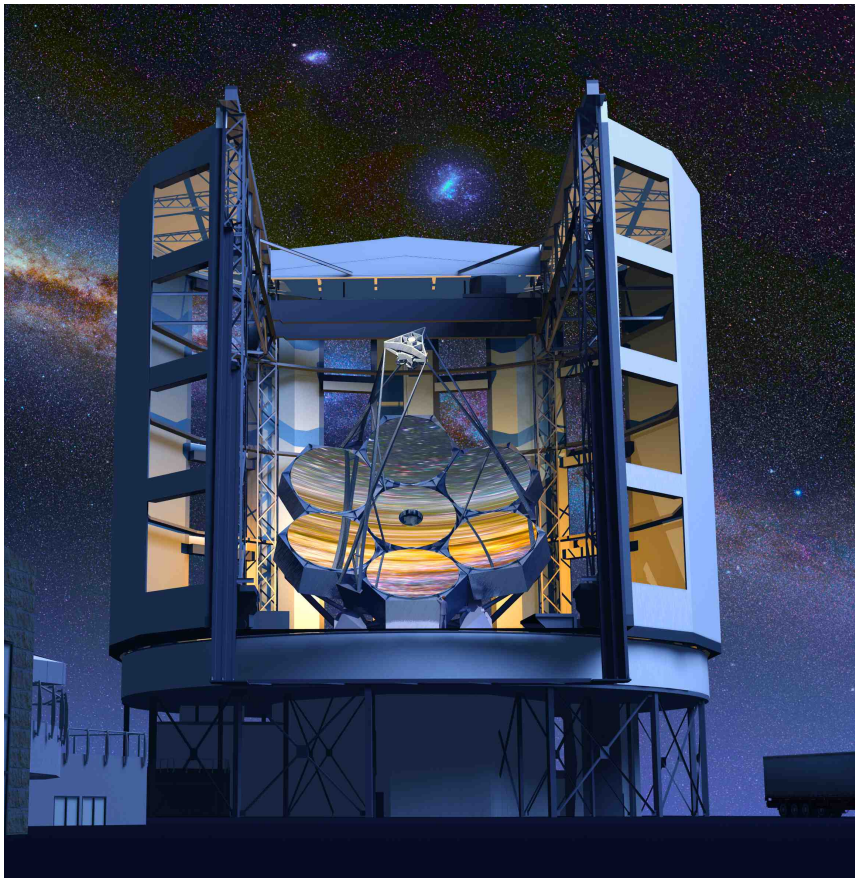
GMT – Giant Magellan Telescope

- 21.9-m effective aperture
  - 7 mirrors / 8.4-m
  - 20’ FoV
- Early science mid-2019
  - With 4 mirrors
- All 7 mirrors and AO ~2022
- Located at Las Campanas



- First instruments
  - Optical MOS
  - Optical Echelle
  - Near-IR AO IFU/Imager

- Queue / Remote / Classical operating modes

GMT Partners

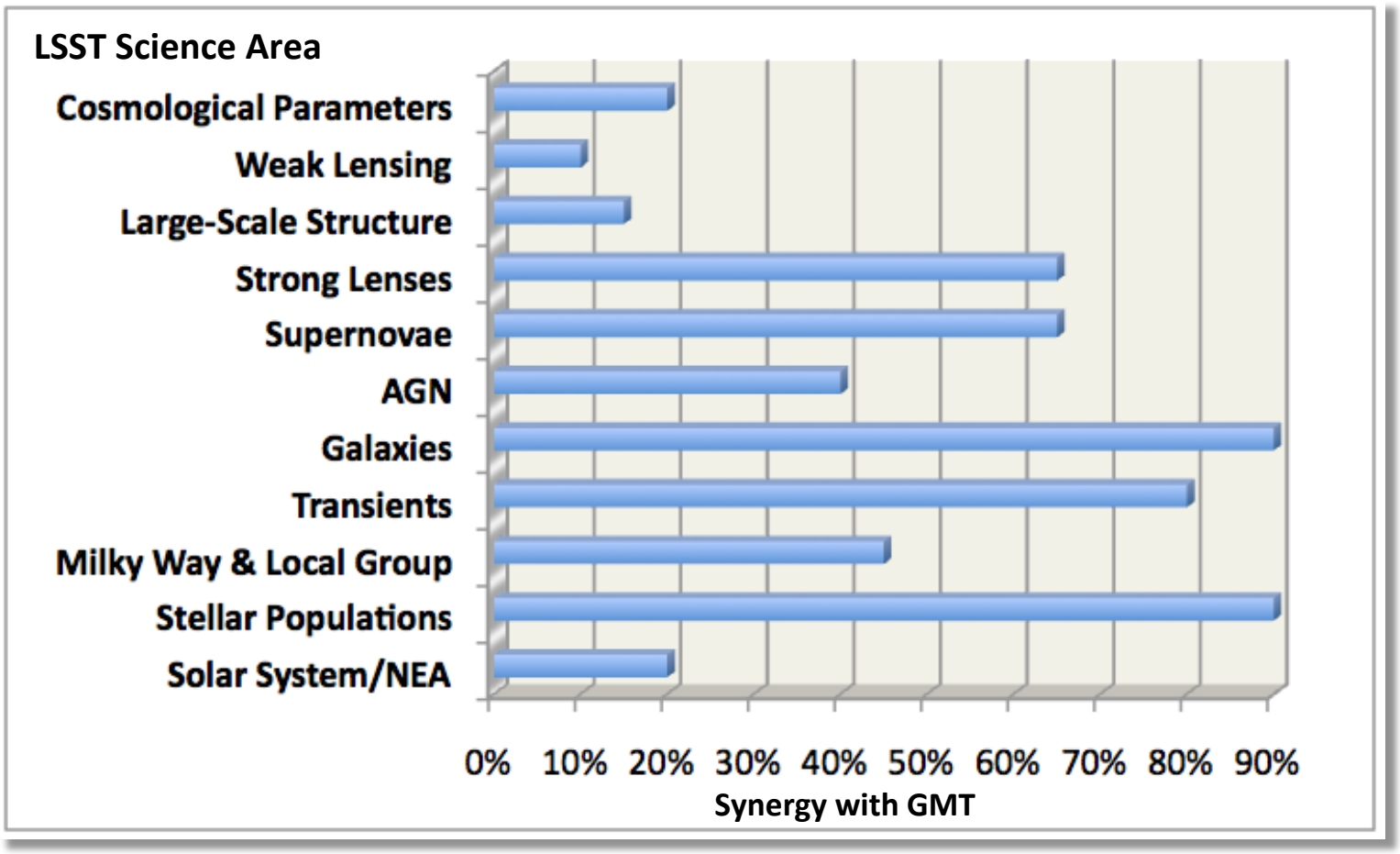
LSST Members

- Harvard
- SAO
- Texas A&M University
- University of Arizona
- Chile

Not LSST Members

- University of Chicago
- University of Texas - Austin
- Carnegie – DTM
- Carnegie – Observatories
- Australia
- South Korea

GMT Science Case - Synergy with LSST

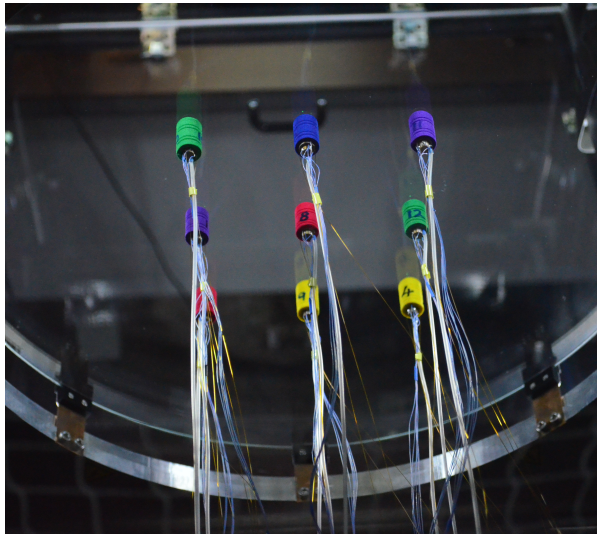


GMT Instrumentation Timeline: 1st Gen

- **G-CLEF** High resolution spectroscopy: late-2019 [Andrew Szentgyorgyi]
  - R = 100,000 / 40,000 / 25,000 [S/N ~ 10 for 1^h at r=22]
  - Modes: Precision radial velocity / precision abundance / high throughput
  - 0.36 – 1 um (full coverage with dual-beam design)
- **GMACS** Multi-object optical spectroscopy: mid-2020 [Darren DePoy]
  - R = 1250 (blue) and 2500 (red) [S/N ~ 10 for 1^h at r=25]
  - >80 slitlets per mask
  - FoV: >8 arcmin
  - 0.38 – 1 um (full coverage, dual-beam)
- **GMTIFS** AO near-IR IFU spectrograph / imager: 2021 [Peter McGregor]
  - R = 5,000 and 10,000
  - Image slicer IFU: 6, 12, 25, 50 mas spaxels (45 slits x 88 spatial x 4096 λ)
  - ZJHK coverage
  - Imager: 20" FoV; 5 mas pixels

GMT Instrumentation Timeline: Possible 1st Gen

- MANIFEST Facility fiber feed: 2022 [Matthew Colless]
  - FoV: 20 arcmin
  - Single fibers / small deployable IFUs / image slicer fiber bundles
  - Feeds for G-CLEF
    - 6 objects with full spectral coverage
    - 40 objects with limited order coverage
  - Feed for GMACS
    - 200-300 objects
    - Image slicers to improve resolution (to 10,000)
    - Some deployable IFU bundles
  - Minimum spacing < 10”
  - Configuration in 2 min



ToO: Time Needed to Get on Target

- 5-15 minutes: depends on active instrument and desired instrument
- Best case: Use current instrument (but assume large slew)
  - Slew (2), Active Optics (3) = 5 min
- Intermediate:
  - Add AO setup time when AO needed (~5) = 10 min
- Worst case: Switch to AO instrument from large natural seeing instrument
  - Go to zenith (1), insert M3 (5), slew (1), Act Optics (3), AO (5) = 15 min

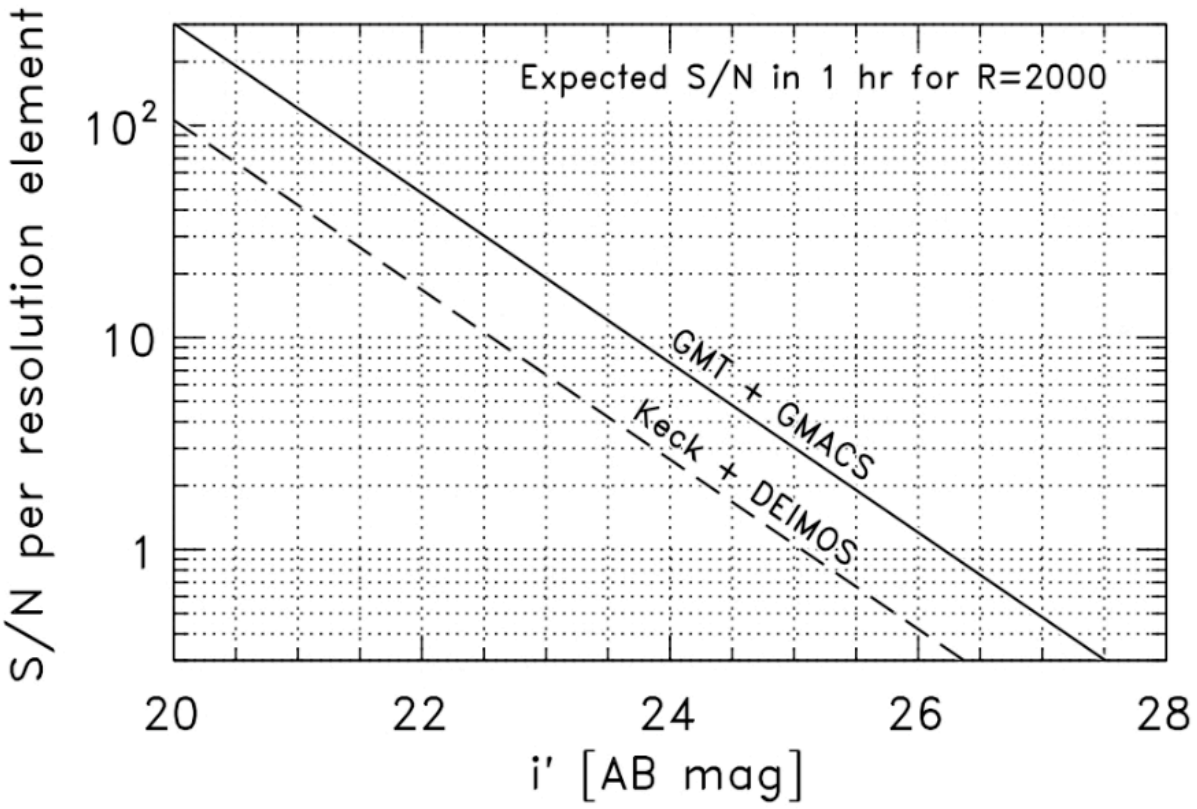
Exposure Time Calculators

- G-CLEF:
  - http://alerce.astro.puc.cl/gclef.html
- GMACS:
  - http://snagglepuss.as.utexas.edu/cgi-bin/gmacs.cgi
- GMTIFS (spectrograph)
  - http://www.mso.anu.edu.au/gmtifs/Performance/GMTIFS-IFS-ETC.shtml

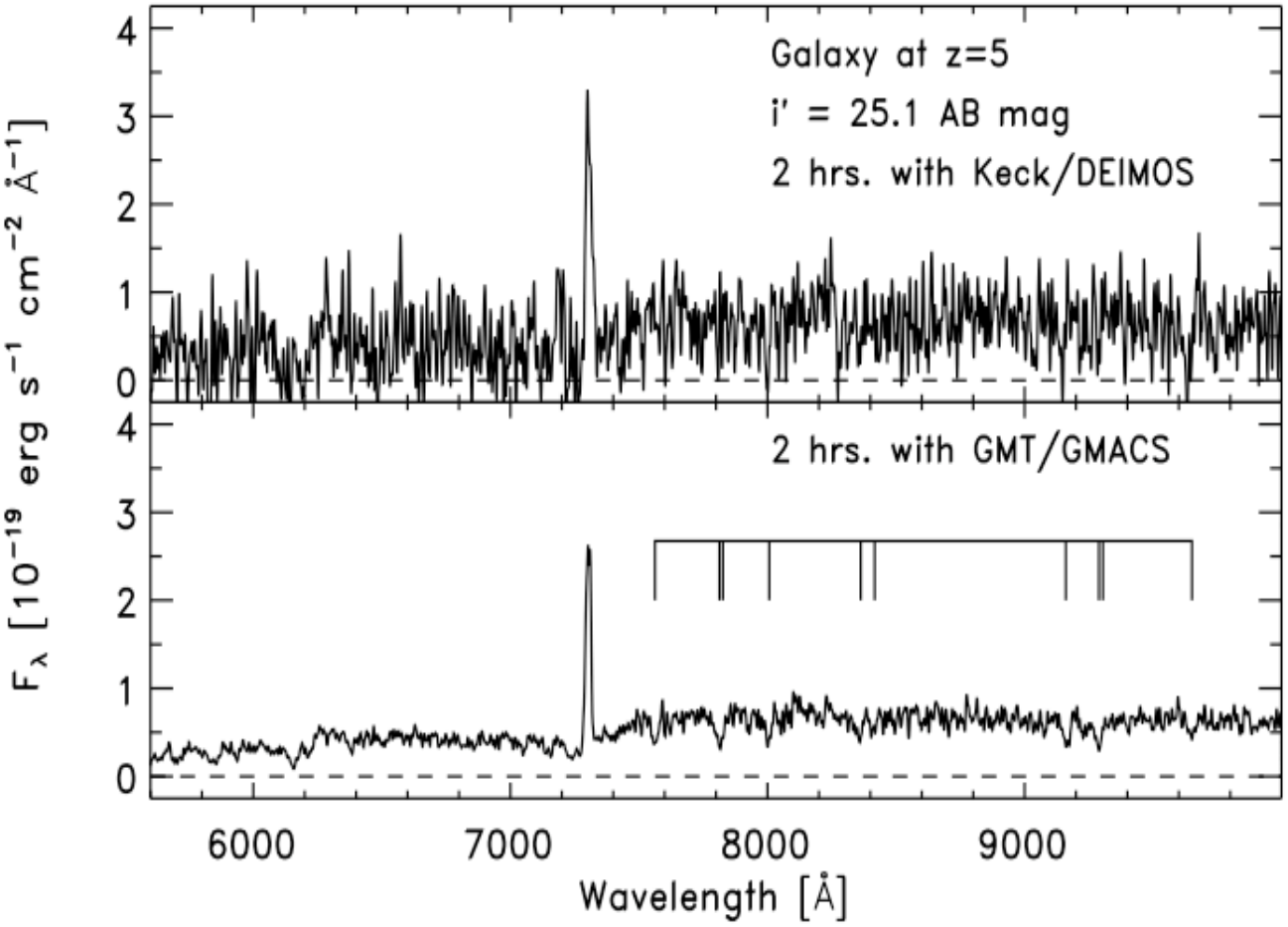
GMACS Conceptual Design

- Faint Object Spectrograph for the GMT
  - Wide-field
    - More than 100 arcminute^2
  - Multi-object
    - Direct slit plates
    - 1000 simultaneous targets at low resolution
  - Moderate resolution
    - 200-5000
  - Optical
    - 380nm to 1000nm simultaneous coverage
  - Seeing limited (0.7 arcsec slit)
- MANIFEST fiber feed allows access to entire 20 arcmin diameter GMT field

GMACS Conceptual Design

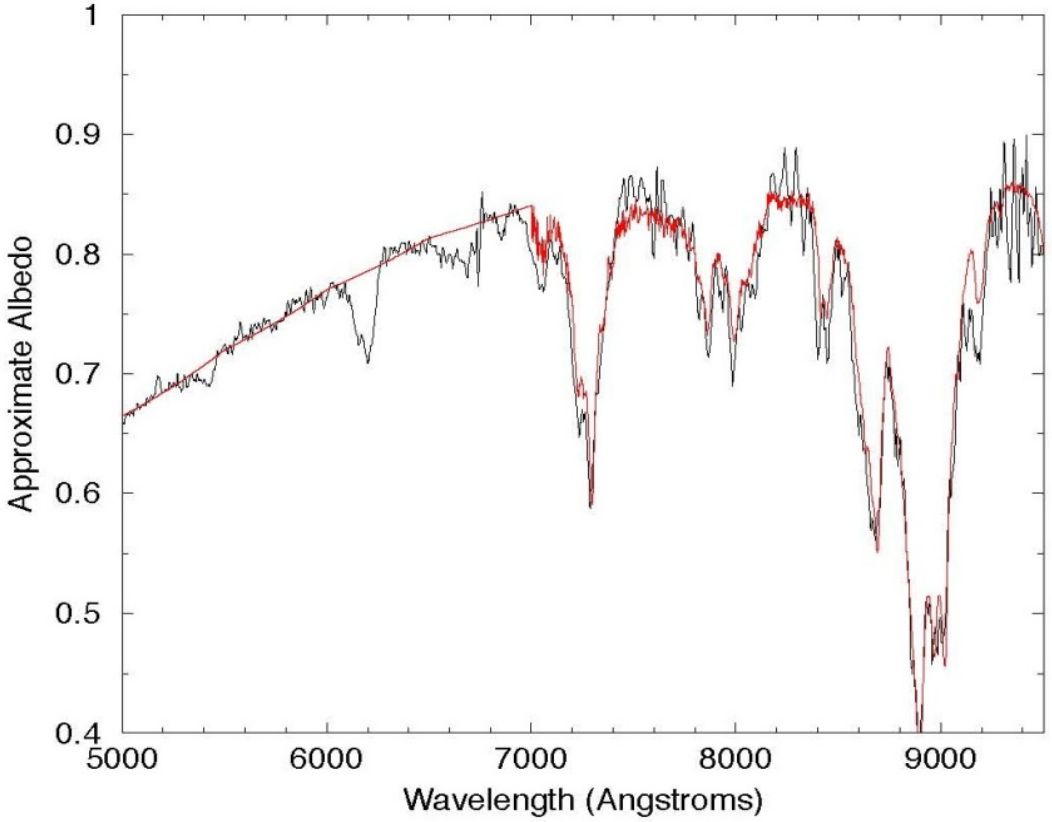


GMACS Conceptual Design



TNO/KBO surface composition

Example: CH_4 surrounded by LN_2 ice



END

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