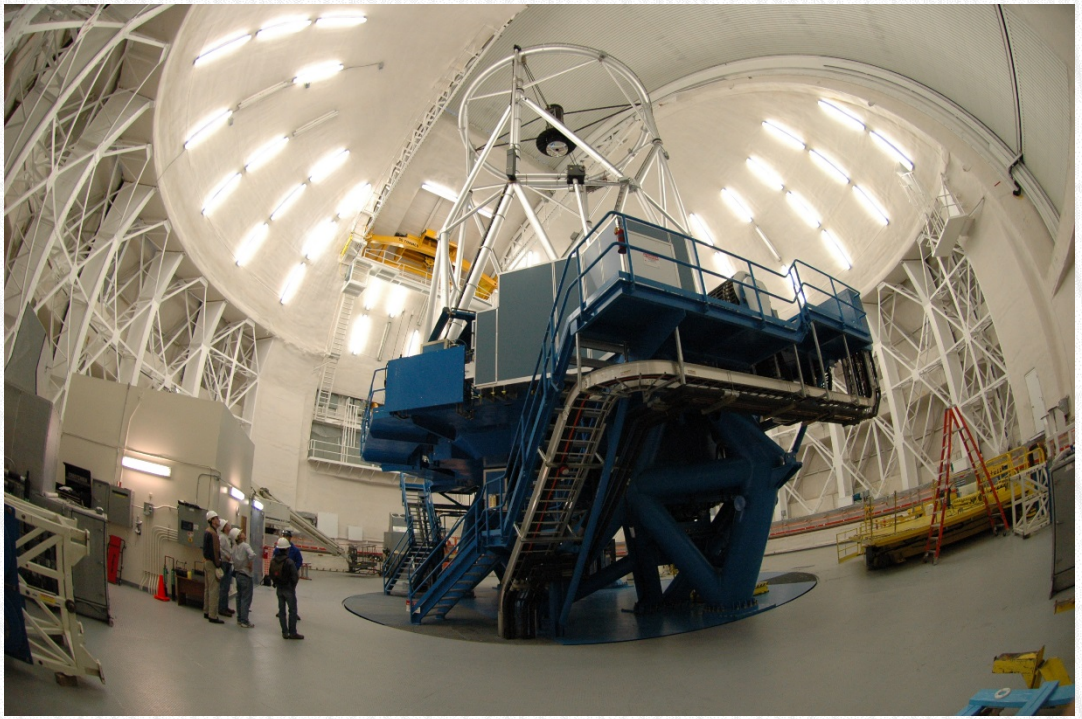
Gemini
Development Update

Scot Kleinman
Associate Director of Development

Development Activities

- **Adaptive Optics and Telescope**
  - Altair (GN)
  - GeMS (GS)
  - Vibrations (both)
- **New Instruments**
  - *GRACES*
  - GHOST
  - GIFS →Gen4#3



- **New Capabilities for Existing Instruments**

http://www.gemini.edu/sciops/future-instrumentation

Altair Improvements

Vibrations - (Tom Hayward)

- Mitigated at GN this year by sending signals to the secondary to counter the dominant 12Hz primary mirror cell vibration (VTK)
- Will be applied to Altair hopefully later this year
- Further frequency corrections require a better realtime computer

Realtime Computer – (Olivier Lai)

- Could allow for more frequencies of vibration correction
- Would allow for other advanced algorithms for improved performance
- Starting this year

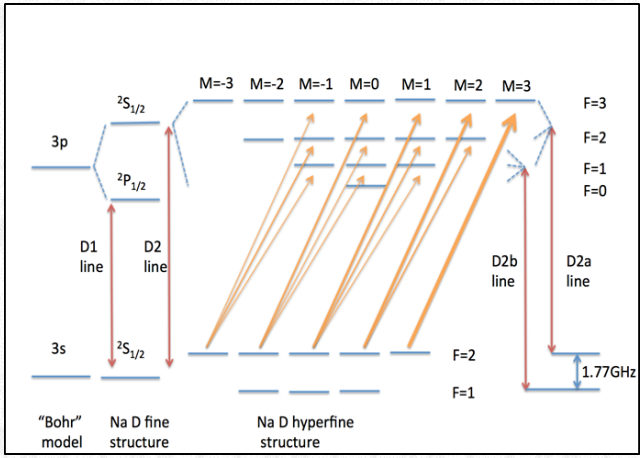
GeMS Upgrades

NGS2 (Chad Trujillo)

- Replace current system to improve limiting magnitude by at least 1.5mag
- Should increase sky coverage at least by factors of several

Laser

- Just completed extensive feasibility studies of replacing laser with something more sustainable
- Study recommended proceeding to procurement
- STAC / Board agreed

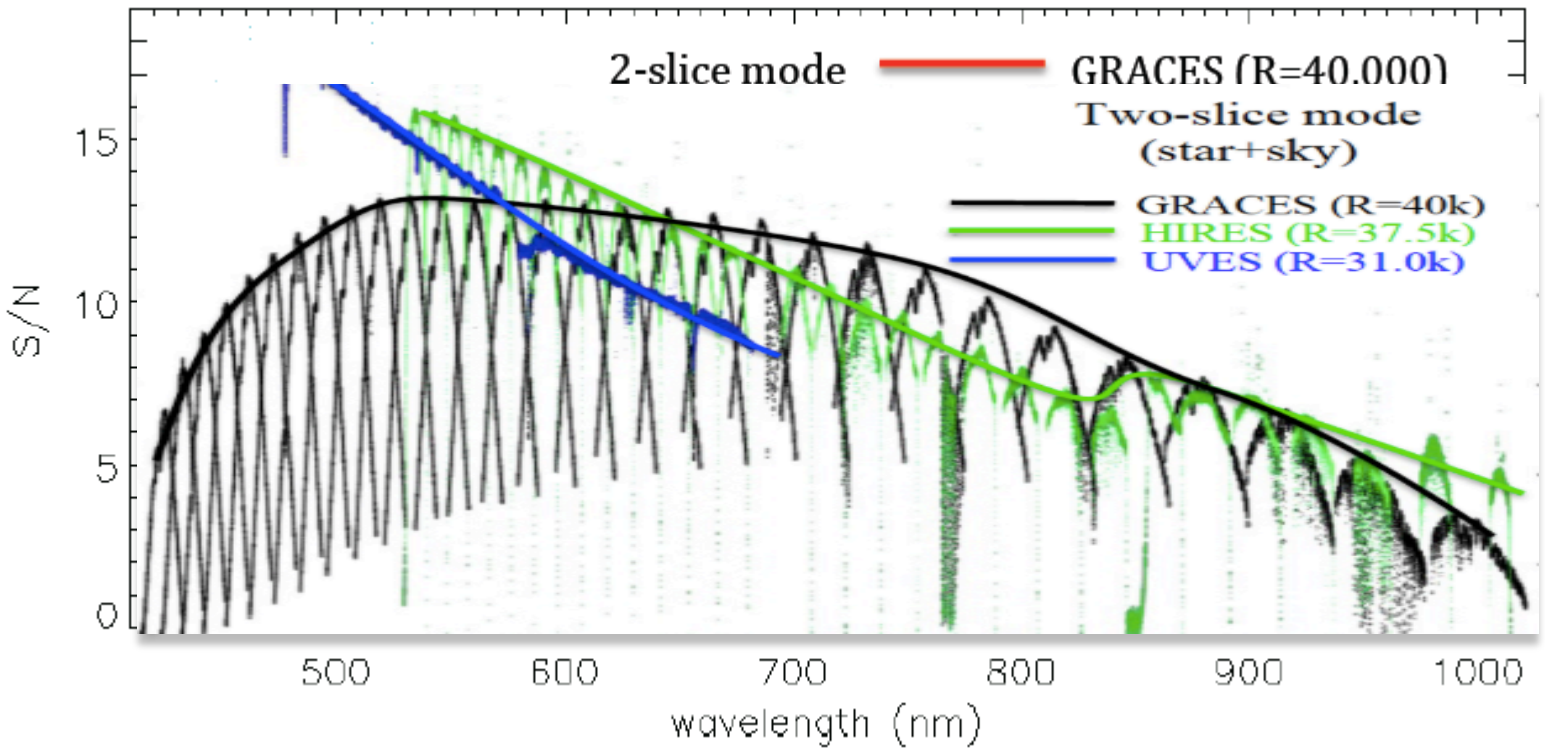


DM0

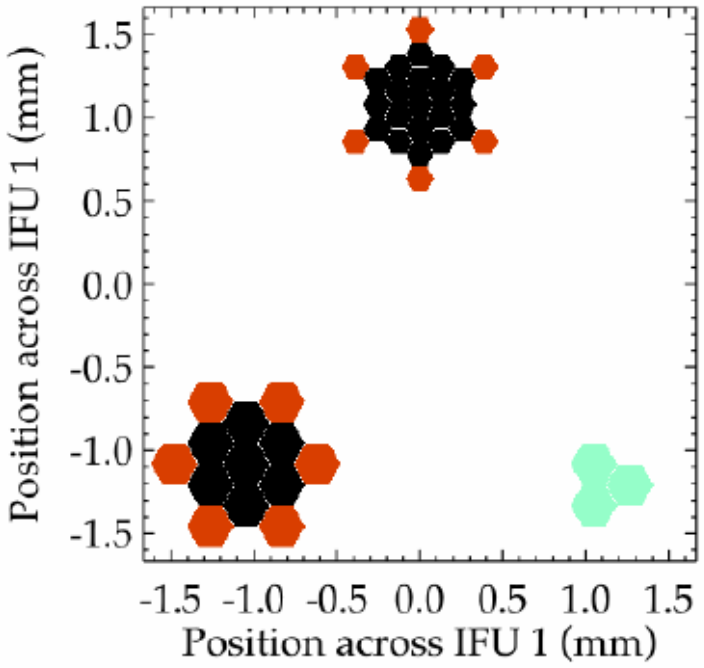
- Intending to purchase new DM0 and electronics
- Installation will wait until after NGS2 and Laser
- Will be used only as a spare in the interim

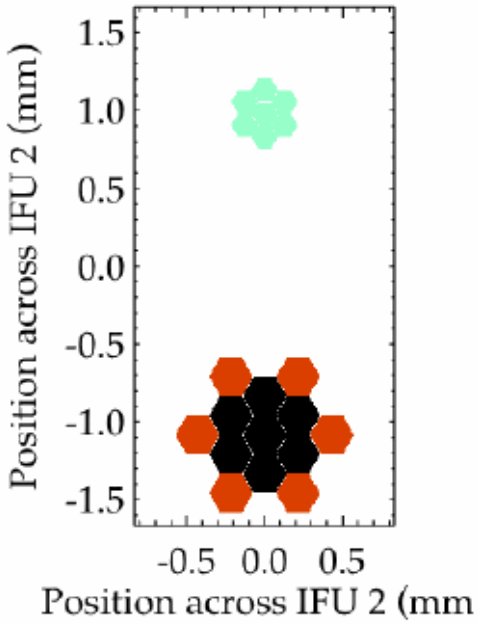
GRACES

(André-Nicolas Chené)

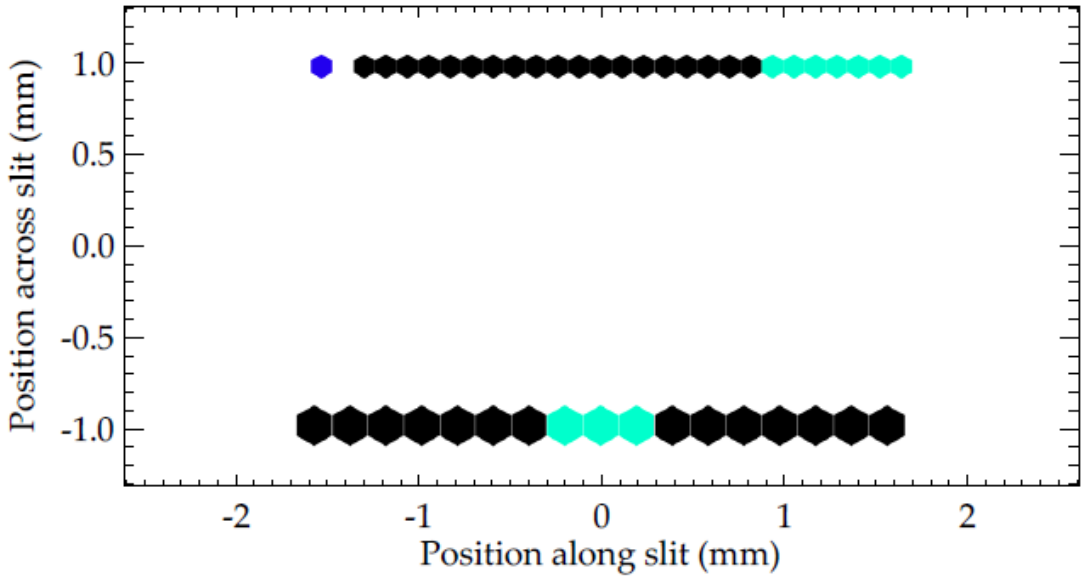


GHOST IFUs





Pick up a Convenient Fact Sheet.



GIFS Studies

- **GEONIS:** The Gemini Efficient Optical and Near-infrared Imager and Spectrograph study is being led by Nick Konidaris and managed by Dan Reiley at the California Institute of Technology.

- **GMOX:** The Gemini Multi-Object eXtra-wide-band spectrograph study is being led by Massimo Robberto and managed by Stephen Smee at Johns Hopkins University. Main collaborators include the Space Telescope Science Institute and the Rochester Institute of Technology.

- **MOVIES:** The Montreal-Ohio-Victoria Echelle Spectrograph study is being led by Alan McConnachie and managed by Les Saddlemyer at the National Research Council of Canada Herzberg. Main collaborators include Ohio State University and the Université de Montréal.

- **OCTOCAM:** The OCTOCAM study is being led by Antonio de Ugarte Postigo and managed by Pete Roming and Christina Thöne. The project is being coordinated from the Instituto de Astrofisica de Andalucia (IAA-CSIC), with main collaborators at the Southwest Research Institute, Fractal SLNE, and George Washington University

http://www.gemini.edu/sciops/future-instrumentation/gifs-public-announcement

GIFS

- Feasibility Studies are meant to harness community expertise to generate valuable science cases and implementation ideas consistent with the STAC guidelines for Gen4#3.
- We are not selecting one of these to go forward. We are using these studies to better inform the requirements we wish to make on the Gen4#3 design and build proposals.
- We expect and hope that these teams, along with others, will propose for Gen4#3.

Current Instrumentation

4 instruments + 1 AO system at each site

3 instruments and the AO system simultaneously mounted

Site	Instrument		FoV, Mode, Resolution	AO Support
Gemini-N	GMOS-N NIRI NIFS GNIRS	360-940 nm 1-5 µm 950-2400 nm 1-5 µm	img 5.5 'x5.5' LS, MOS, IFS (5" x7") R: 600-4,000 img 20" x20" - 120" x120" LS R:500-1,000 IFS (3" x3") R:5000 LS R:1,800-18,000 (+img)	(ALTAIR) ALTAIR ALTAIR ALTAIR
Gemini-S TBC 2018	GMOS-S GSAOI FLAMINGOS-2 GPI (GHOST)	360-1000 nm 950-2400 nm 950-2400 nm 900-2400 nm 360-1000 nm	img 5.5 'x5.5' LS, MOS, IFS (5" x7") R: 600-4,000 img 85" x85" with MCAO img 6.1' ∅ LS, (MOS) (2' x6') R: 1,200-3,000 IFU 2.8" x2.8" contrast: 10^7 at 0.4" 2 IFUs in 7' ∅ R: 50,000 + 75,000	(GeMS) GeMS (GeMS) XAO (None)
Visiting	TEXES (GN) DSSI (GN) (GRACES)	5-25 µm 400-1000 nm ~550-1000 nm	LS R: 4,000 - 85,000 Dual EMCCD imaging, 20 mas resolution@650nm see CFHT/ESPaDOnS - high-res. spectrograph	none speckle none

Visiting Instruments

- http://www.gemini.edu/sciops/instruments/visiting-instrument-policy
  - Contact Gemini: Andy Adamson (aadamson@Gemini.edu)
  - Apply through standard TAC or LPTAC
  - Advanced testing/setup time can be accommodated
  - Bring instrument and use it
  - If you want to come back, let's talk about opening it up to Gemini community
- Good path into new instrument procurement model framework

Funding new Instruments

- Available funding does not allow recycling of instrumentation suite on any reasonable timescale
- *We would like to take better advantage of potential in-kind contributions including outside funding sources Gemini does not have direct access to*
- Telescope time and access can also be forms of compensation
- We want to lessen the burdens and increase the return of the required competition

Instrument Opportunities

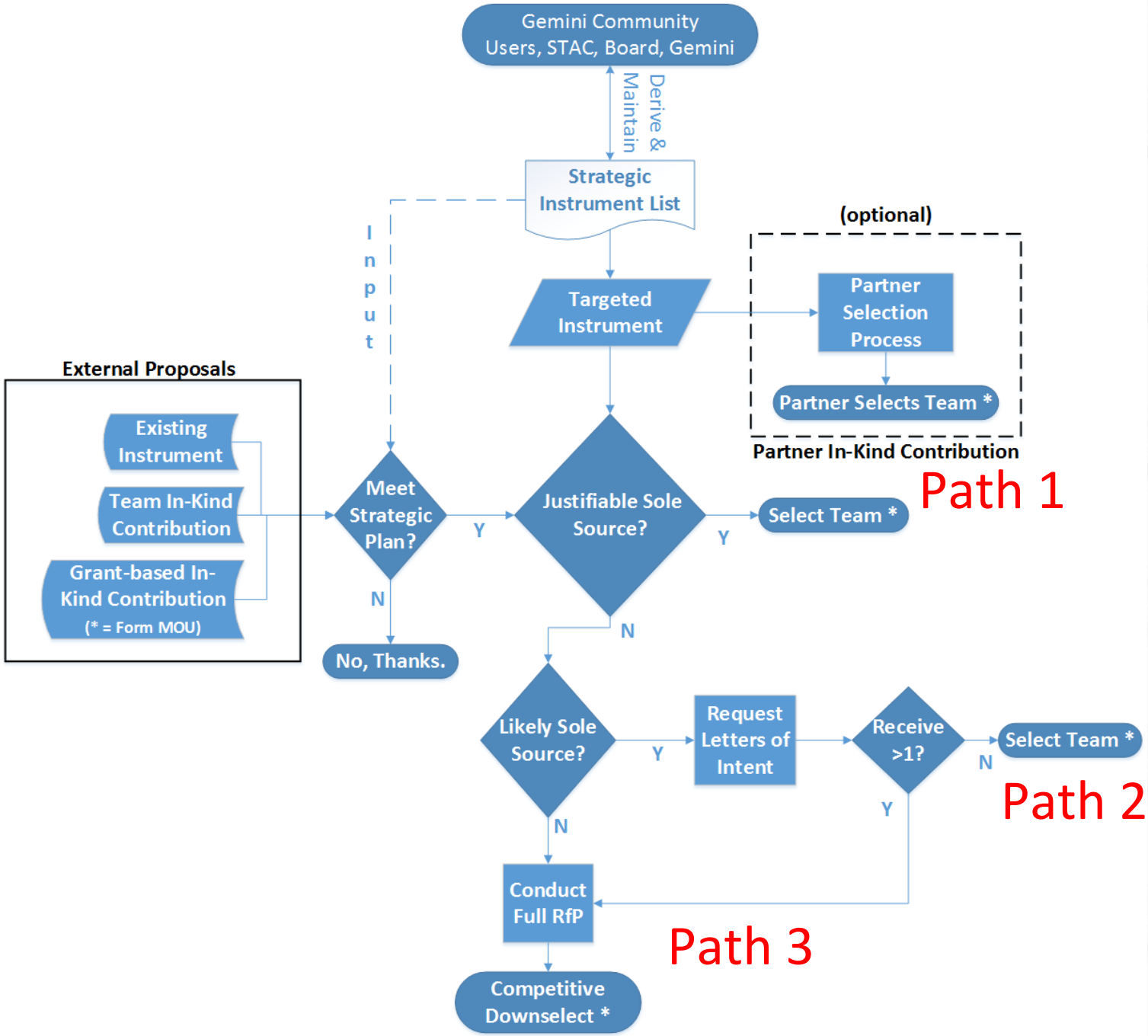
Current Instruments (R. Diaz)

- **Coming soon**: ~$200K available to start.
- **2016:** Increase funds to ~$600K or more to allow for larger projects
- Calls may be targeted or open
- Goal is to have more interactions with community and keep current instruments operational and competitive

New Instruments

- GIFS underway now
- (~2016) Gen4#3
- Visiting instruments
- In-kind contributions
- (2018?) Gen4#4 starts

The end


Gemini Community
Users, STAC, Board, Gemini
Derive & Maintain
Strategic Instrument List
Input
(optional)
Targeted Instrument
Partner Selection Process
Partner Selects Team *
Partner In-Kind Contribution
External Proposals
Existing Instrument
Team In-Kind Contribution
Grant-based In-Kind Contribution
(* = Form MOU)
Meet Strategic Plan?
Y
Justifiable Sole Source?
Y
Select Team *
Path 1
N
No, Thanks.
N
Likely Sole Source?
Y
Request Letters of Intent
Receive >1?
N
Select Team *
Path 2
Y
N
Conduct Full RfP
Path 3
Competitive Downselect *

GHOST

- Gemini High-resolution Optical SpecTrograph
  - Team: Australian Astrophysical Observatory
  - NRC-Herzberg
  - Australia National University
- Fiber-fed, bench mounted spectrograph
- Two object + sky: *R=50,000*
- Single object + sky: *R=75,000*
- Microlens-based IFUs for image slicing
- Full simultaneous coverage: *363-950nm*
- Simultaneous Th-Ar calibration possible

Development Priorities (201505)

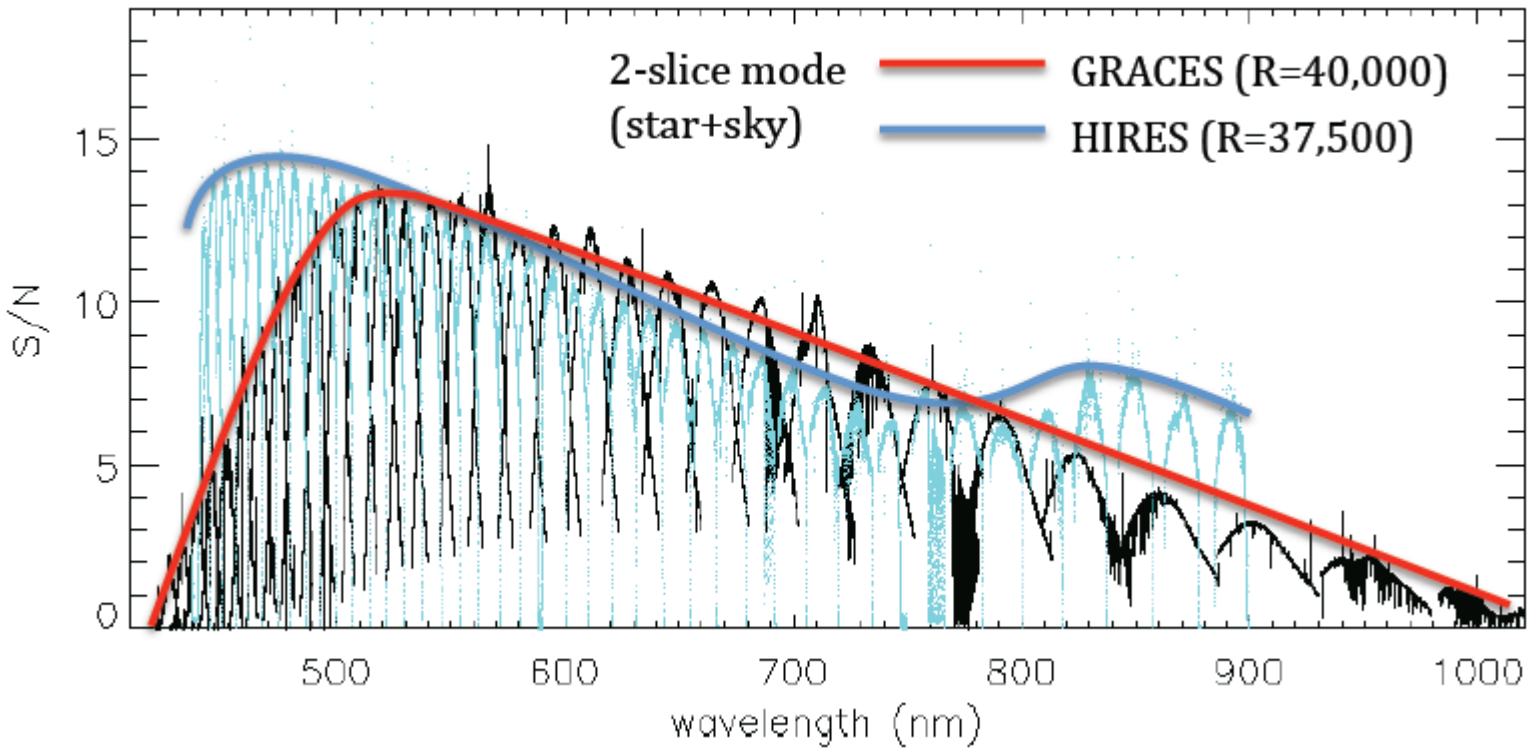
- GHOST (Henderson)
- GIFS → Gen4#3 (Goodsell)
- GMOS CCDs (Lazo)
- LGSF (Toptica) (Lazo)
- Small Project Inst. Upgrades (Diaz)
- NGS2 (Trujillo)
- ALTAIR RTC Upgrade (Lai)
- NICI (Lai, Hayward)
- DM0 (Trujillo) *Procurement only*
- A&G (Boucher-2015/Lazo-2016)
- GNIRS Controller upgrade (Henderson)

GIFS

- The instrument should be a workhorse instrument, meaning that it has **broad scientific appeal** and enables a wide range of science cases.
- The proposals should be science driven and include science cases. Science cases that provide **synergies with new capabilities coming online (e.g. LSST, JWST, ALMA, etc)** are highly desirable, especially including capabilities needed to follow up survey discoveries.
- The technical risk of the instrument should be modest, i.e. the success of the instrument should not depend upon some not-yet-proven technology.
- The instrument should be highly efficient, maintaining the 8-m aperture advantage.
- Although proposals for all instruments fitting these criteria will be fully considered, it is the majority opinion of the STAC that a *wide-bandwidth moderate-resolution spectrograph* is likely to prove most compelling.

http://www.gemini.edu/sciops/future-instrumentation/gifs-gemini-instrument-feasibility-studies

GRACES vs HIRES



Gemini Development

Scot Kleinman
Stephen Goodsell, Ruben Diaz
Madeline Close
Chad Trujillo
Tom Hayward, Olivier Lai

Possible Topics

- **Small Project Possibilities**
- **GMOS Update**
- **GHOST (Gen4#3?) and 4+1**
- **New Procurement Model**

http://www.gemini.edu/sciops/future-instrumentation