GEMINI PLANET IMAGER (GPI)
CALL FOR CAMPAIGN SCIENCE PROPOSALS

The Gemini Observatory is pleased to announce a Call for Proposals for GPI Campaign Science. GPI is a technologically advanced instrument designed specifically for obtaining images and low-resolution spectra of faint objects and/or features very near to bright objects. While GPI's primary science goal is the detection and characterization of exoplanets, its high contrast capabilities will allow significant scientific advances in the areas such as circumstellar disks, stellar evolution (mass transfer), fundamental stellar astrophysics (binaries) and solar system objects.

GPI is expected to be available for science use in Semester **2012B.**

Proposals

GPI Campaign proposals should embrace a large, scientifically compelling and statistically significant investigation in the chosen science area. Gemini will choose the most scientifically compelling proposal or proposals for scheduling.

As GPI will require median or better observing conditions to operate effectively, all successful programs will be executed in queue mode. However, the Observatory encourages successful science teams to plan on spending time a significant time in Chile during the commissioning and early science period so that they can gain a full understanding of GPI's performance.

We anticipate considering programs that request from 200 to 1200 queue hours of telescope time, spread over a maximum of six semesters. (Note: the GSC will recommend and the Board will approve the total number of hours to be available for GPI Campaign Science and the allowed time per program, following the receipt of Letters of Intent. The final Call for Campaign Science Proposals will include these approved values.) A maximum of 180 campaign hours per semester will be scheduled as science ranking band 1. Proposers may request time to be scheduled in band 2.

The standard proprietary period for data is 18 months after acquisition of individual observations. Proposals may request and justify a longer proprietary period for specific campaign observations.

Proposals should address any necessary precursor or followup observations needed to accomplish the science goals of the program and describe how these observations will be obtained. Allocation through the Campaign will be for use of GPI alone.

Collaboration of teams from across the Gemini partnership is encouraged, and partner participation is a criterion by which campaign proposals will be evaluated.

Proposals must include:

a. a discussion of the primary scientific goals of the project;

b. a description of the experimental design, including sample selection, use of GPI, scheduling requirements, calibration, etc.;

c. a statement of the time requested by semester and by science ranking band;

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d. a description of data products compatible with the international virtual observatory to be delivered, and the timeline for their delivery;

e. a management plan that describes staffing and resources available to complete the science program. The management plan must also describe

   i. the expected contributions of each participant;
   ii. data management procedures, including access to data within the team;
   iii. who is responsible for submitting progress reports and final reports;
   iv. the process for redirecting the research agenda as discoveries are made;
   v. the mechanism for routine communication among research team members.

The scientific justification of the proposal, including relevant figures and captions, is limited to 5 pages. The experimental design, including figures and captions, is limited to 6 pages. References and the required management plan are limited to 4 pages.

Proposals should be submitted via email to Gemini Deputy Director/Head of Science, Nancy Levenson, nlevenson@gemini.edu by 5:00PM HST on March 31, 2011 (03:00 GMT on April 1, 2011).

The Instrument

Additional details about the instrument and its expected performance will be included in the final version of this document.

General information about GPI is available from the instruments section of the Gemini website, http://www.gemini.edu/sciops/instruments/GPI, and current updates on GPI can be found at www.planetimager.org. Figure 1 shows the expected H-band contrast vs. separation as a function of guide star I-band magnitude. Successful campaign proposers will be allowed to request minor adjustments to target lists and exposure times in light of actual on-sky performance of GPI. Gemini will be responsible for evaluating and approving these requested changes.

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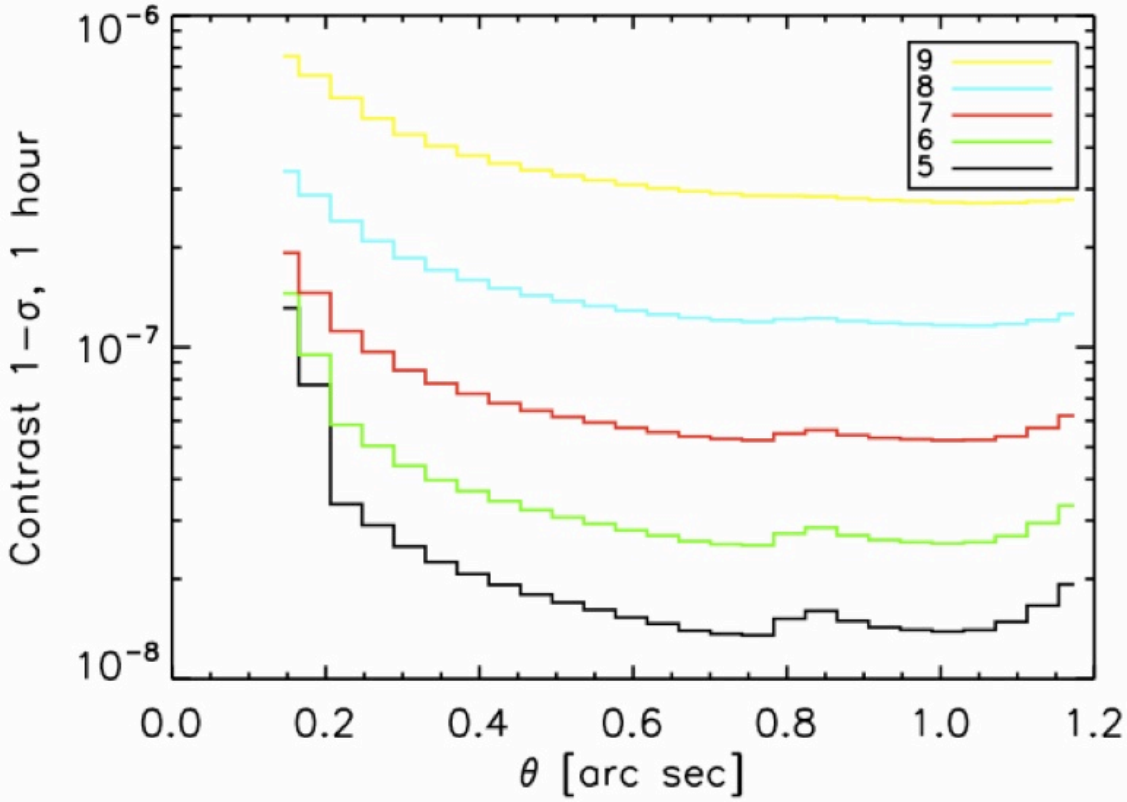

Figure 1: H-band contrast vs. separation as a function of guide star I-band magnitude, for one-hour integration time. The calculated contrast includes speckle noise, photon shot noise, and speckle suppression using elementary angular and spectral differencing techniques assuming a T dwarf spectral signature. The calculation is for a single GPI spectral resolution element (2.5% band-pass). Coronagraph performance is nearly achromatic across the *H* band, so broadband contrasts would be a factor of 3 higher. (Credit: GPI instrument team.)

To achieve its contrast goal, GPI consists of six integrated subsystems:

- The adaptive optics (AO) system, responsible for fast measurement of the instantaneous wave front, and for providing wave front control via deformable mirrors. The optical components and mechanisms for the AO system are provided by the OMSS.
- The calibration unit (CAL) is a high-accuracy infrared wave front sensor tightly integrated with the coronagraph. It provides precise and accurate measurements of the time-averaged wave front at the science wavelength and coronagraph focal plane, so that persistent speckles caused by quasi-static wave front errors not dominate the final image. It also provides pointing, focus, and low-order aberration sensing to keep the target star centered on the coronagraph.
- The coronagraph uses a combination of apodized masks and focal-plane stops to control diffraction and pinned speckles.
- The science instrument—an integral field spectrograph (IFS)—produces the final scientific image or data cube, including simultaneous multiple wavelength channels to suppress residual speckle noise and polarimetric capability. It also provides a diagnostic pupil-viewing mode and contains the final Lyot stop for the coronagraph.

- The upper-level software running on the Top-Level Computer (TLC) coordinates sequencing and communication between subsystems and between GPI and the observatory software. It also provides motion control for all the subsystems. In the previous conceptual design, this was referred to as the Supervisory and Control Computer (SCC).
- The opto-mechanical super structure (OMSS) mounts and connects all the subsystems and mates to the Gemini ISS. The AO optics and elements mount directly to the OMSS' optics bench, while a flexure-sensitive frame holds other major subsystems. This is in turn surrounded by an environmental enclosure with attached electronics racks.

Research Collaboration Agreement

Each successful GPI Campaign Project will require a "Research Collaboration Agreement" signed by all members of the team before the campaign starts and submitted to the Gemini Deputy Director/Head of Science. The requirements of this agreement are described in the separate document: "Policies for GPI Campaign Projects."

Program Review

Each successful GPI Campaign Project is to submit annual progress reports to the Gemini Director. These reports should contain (at a minimum) a summary of the observing time used thus far, comments on the quality of the data and whether the data quality is sufficient to meet the scientific goals of the program, a summary of the activities of each team member, the status of reduction of the data, and detailed plans for the next year of the project. The report should also indicate any preliminary science results arising from the project. Gemini and the GSC will assess these reports to determine if continuing campaign observations are warranted.

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