

[NExSci Home](#)[For the Public](#)[KECK](#)[SIM](#)[Exoplanet Exploration](#)[ABOUT](#)[CONFERENCES](#)[SAGAN
PROGRAM](#)[MISSIONS &
INSTRUMENTS](#)[SCIENCE AT
NExSci](#)[SCIENCE DATA](#)[SOFTWARE &
WEB TOOLS](#)[HELP](#)

Applicants for NASA Allocated Observing Time on the Keck Telescopes

[FAQ Page](#)

Table of Contents

[I. Guidelines for Allocation of NASA Keck Telescope Time](#)[II. Proposals in Support of NASA Space Missions](#)[III. Multi-Semester Proposals](#)[IV. Call for Corot Key Science Projects](#)[V. Publication Acknowledgement](#)[VI. Target of Opportunity Proposals](#)[VII. Application Procedures](#)[VIII. General Announcements](#)

I. Guidelines for Allocation of NASA Keck Telescope Time

NASA announces a call for proposals to utilize its share of observing time at the Keck Observatory. This call for semester 2009A (February 2009 to July 2009) will allocate approximately 45 nights of observing, divided roughly evenly between the two telescopes and across dark, grey and light time. Proposals are due on September 8, 2008 at 4pm PDT with non-binding letters of intent ([see below](#)) due on August 15.

NASA intends the use of its time allocation on the Keck telescopes to be highly strategic in support of on-going missions and/or high priority, long term science goals. The NASA Keck time is not generally intended to be a substitute for the ground based support for individual projects now provided through the National Optical Astronomical Observatory (NOAO) which offers time on NOAO's 4 m telescopes as well as the Gemini 8 m telescopes. This joint NASA-NOAO time is allocated through processes associated with each NASA mission's proposal cycle (e.g. HST, Spitzer, Chandra, GLAST).

The scientific areas in which proposals are being solicited are:

1. Investigations in support of Exoplanet Exploration science goals and missions
2. Investigations in support of Cosmic Origins science goals and missions
3. Investigations of our own solar system
4. Direct mission support

NASA's long term research goals are described in the NASA Strategic Plan: http://msc.caltech.edu/documents/Science_Plan_07.pdf.

The goals of the Exoplanet Exploration area are described in a number of documents and presentations (see <http://exep.jpl.nasa.gov/>), most recently in the report of the Exoplanet Task force to the Astronomy and Astrophysics Advisory committee: http://www.nsf.gov/mps/ast/aaac/exoplanet_task_force/reports/exoptf_final_report.pdf.

Within the Exoplanet Exploration area, NASA will support a Key Project(s) to follow-up on discoveries made with the French transit satellite, CoRoT. The guidelines for CoRoT Key Science proposals can be found [below](#). NASA will not solicit general proposals for the use of the Keck telescopes in support of the Kepler mission exoplanet transit Key Project until the first public release of Kepler data becomes available.

Cosmic Origins Science topics include stars, star formation, galaxies/AGN, and galaxy formation as described in the NASA Strategic Plan (http://msc.caltech.edu/documents/Science_Plan_07.pdf) as well as in other NASA material available at <http://nasascience.nasa.gov/programs/cosmic-origins>. Proposers should base their science case in terms of

strategic relevance toward achieving these goals.

Examples of previous strategic projects with the NASA Keck time include the eta-Earth survey and the KI Nulling Exo-zodiacal Dust Survey which are in direct support of the goals of NASA's ExoPlanet Exploration initiative Projects. Programs requiring many nights of Keck time over multiple semesters (up to 4 semesters) may be submitted in response to this call, but must explicitly and strongly justify their strategic connection to the stated goals. See [Section IV](#) for the current multi-semester strategic project.

Within these broad guidelines, the allocation of time will be made based on scientific merit, strategic importance, availability of resources, and technical appropriateness. All proposals for use of NASA Keck time will be evaluated by a panel of scientists comprising the NASA Keck Telescope Allocation Committee (NASA/Keck TAC). The TAC process will be administered by the NASA Exoplanet Science Institute (NExScI), formerly known as the Michelson Science Center (MSC). In recognition of the science communities that the NASA Keck time is expected to serve, the TAC members are selected to assure balanced expertise in the areas of exoplanets, objects in our own solar system, and in support of NASA's Cosmic Origins goals. The NASA solicitation of proposals and their evaluation by the NASA Keck TAC will be phased so as to provide the evaluation and ranking of proposals needed to meet the telescope scheduling requirements set by the Director of the Keck Observatory.

The opportunity to propose as Principal Investigators (PIs) for the NASA time on the Keck Telescopes is open to all U.S.-based astronomers ("U.S.-based astronomers" have their principal affiliation at a U.S. institution). However, proposals from PIs with access to the Keck telescopes through other means (faculty and research scientists of the University of California system, Caltech, and the University of Hawaii) should indicate in their proposals how they are using any other Keck telescope time they have been awarded and why their proposed research requires time beyond the allocations available through their universities.

In making requests for telescope time, proposers are advised to bear in mind that runs of more than several contiguous nights are difficult to arrange and must be scientifically and technically justified. Similarly, proposals requesting less than full nights can ordinarily be accommodated only if they can be combined with another selected NASA proposal requiring the same instrument.

Proposals received by the application deadline will be reviewed and ranked by the NASA Keck Telescope Allocation Committee. The committee will then submit their recommendations to the selecting official, the NExScI Executive Director, for final selection. NExScI will then coordinate these final selections with the Keck Observatory for scheduling.

The scientific case for observing time should establish three things:

1. It should outline the scientific problem(s) or question(s) toward whose solution the observations are requested, and place these questions in the larger scientific context.
2. It should show how the measurements requested will be used to illuminate these questions or problems.
3. It should show how the proposed science fits into NASA's strategic goals for its Keck time as listed above.

The technical case should demonstrate that the proposed measurements are technically feasible, given the performance of the proposed instrument(s), in the time requested. Mission support proposals must include additional supporting materials as stated in the [next section](#). The number of target objects required should be justified.

All applications must include complete lists of the objects to be observed, their magnitudes and their approximate equatorial coordinates (sufficient to determine scheduling within the semester). Applications without such lists will be rejected.

Specific points which must be addressed include:

- How the proposed observations relate to the applicant's previous work, and to other work in the field.
- Why the Keck Observatory and its site on Mauna Kea, are particularly important or even essential for the proposed observations.
- Proposals in support of observations from other NASA missions (HST, Spitzer, Chandra, etc) must explicitly justify why the observations cannot be done through the joint NOAO-NASA time.
- The required spatial, spectral, and temporal range and resolution.
- Estimates of the signal-to-noise required and expected, and justification for the number of nights requested for the entire program.
- If new or unusual techniques are to be used, make clear how observations and calibrations will be obtained.
- Brief description of the status of large telescope time that has been awarded during the past 2 years, such as progress with data reduction and publications.

- Any other information that may assist the TAC in evaluating the scientific merits of the proposal and its suitability for the Keck Telescopes.
- The presentation should be aimed at someone who is not a specialist in the area of astronomy under study. A specific scientific case, rather than a broad general one, is usually more successful.
- Proposals that span multiple semesters should additionally justify their extended requests as addressed in [Section III](#).

II. Proposals in Support of NASA Space Missions

The NASA-Keck Telescope Allocation Committee (TAC) occasionally receives observing proposals stating that the proposed observations, to a greater or lesser degree, provide critical and timely support for approved NASA space missions. The TAC accepts these Mission Support Proposals and evaluates them on the basis of their scientific merit just as any proposal however, the NASA Keck time selecting official, the NExSci Executive Director, will take the TAC evaluation and programmatic concerns into consideration in making the final time assignments.

All proposals submitted under the mission support category must include the following:

- A formal justification, in writing, from the flight project, e.g., Project Scientist or Project Manager, including an explanation of the criticality and timeliness of the proposed observations
- A written endorsement from the relevant official at NASA Headquarters
- Clear evidence that the project requires the 10-m Keck Telescopes

Omission of any of these items will eliminate a proposal from consideration.

III. Multi-Semester Proposals

Principal investigators are allowed to submit proposals that span up to 4 semesters. The intent of allowing PIs this option is to reduce workload on both PIs and the NASA Keck TAC for long-term programs that span many semesters. The NASA Keck TAC will be instructed to consider these proposals in light of all of the criteria that apply for single semester proposals, in addition to the following considerations:

- If the proposal were accepted for only a single semester, what is the likelihood that it would be successfully resubmitted over the ensuing semesters?
- How much observing time does the TAC consider appropriate to remove from consideration in upcoming semesters?
- Does the PI have a demonstrated history of successful proposals?

In considering multi-semester proposals, the TAC may recommend accepting the proposal in its entirety, for some subset of the proposed semesters, or reject it outright.

IV. Call for Corot Key Science Projects

NASA is specifically soliciting proposals for follow-up observations of CoRoT transit candidates. These proposals must have a PI based at a US institution and must include participation from the CoRoT team. These proposals may request up to 15 nights per semester for up to 4 semesters. More than one proposal to this Key Science call may be accepted for one or more instruments. Proposals to characterize individual transiting systems already released publicly by the CoRoT team can be submitted via the standard proposal call in the exo-planet area.

Mission Overview

The CoRoT telescope was launched on Dec 27, 2006, and stares at a small number of fields for periods of 30-150 days looking for planets transiting their host stars (see <http://smc.cnes.fr/COROT/>). It is expected that up to 102-103 of the 105 stars monitored by CoRoT will show evidence for transits of planets with radii between the radius of Jupiter and a few earth radii. Significant follow-up work is, however, required first to validate these events as being due to transits and not to other astrophysical phenomena such as eclipsing binary systems and ultimately to characterize such planetary properties such as mass. In addition, the CoRoT mission monitors a small number of bright stars for asteroseismological variations. This aspect of CoRoT is not regarded as directly relevant to NASA's strategic goals for the purposes of the Key Projects considered here.

Observing Scenario and Available Time

In cooperation with the CoRoT team and the French Space Agency (CNES), NASA has agreed to make available up to 15 nights of NASA Keck time per semester for up to 4 semesters to assist with the validation and characterization of CoRoT targets. In return for its contribution of Keck time, CoRoT has agreed that selected US investigators will become "CoRoT Associated Scientists", and cooperate with CoRoT Co-Is or other Associated Scientists on the selected program. As CoRoT Associated Scientists, US investigators will participate fully in the preparation and publication of scientific papers incorporating data from CoRoT and the Keck telescopes.

While US investigators must serve as Principal Investigators on all Keck telescope proposals, the proposal team must include at least one member of the CoRoT team as approved by the PI of the CoRoT mission, Dr. Annie Baglin, through her designated representative, Dr. Magali Deleuil. The CoRoT team has established a wide ranging program of validation and follow-up using a number of smaller ground-based telescopes. It is important that the Keck time be fully integrated into that plan. Interested proposers should contact both Dr. Magali Deleuil (magali.deleuil@oamp.fr) and Dr. Malcolm Fridlund (malcolm.fridlund@esa.int) as soon as possible to ensure a prompt response in establishing the appropriate coordination and collaboration.

It is expected that Keck observations in the following areas will be of primary importance in the overall CoRoT program:

A. Characterization of the parent stars

- In many cases, spectroscopic observations taken to determine stellar radial velocities are insufficient to characterize the host star. CoRoT planets are predominantly found around relatively faint stars (14 mag). Spectra with a S/N of ~200 with a resolution around 60,000-70,000 are needed for the requisite modeling and demand a large telescope. The objective of this spectroscopy is to provide improved stellar parameters (including metallicity and age estimates) and thus improved planet parameters.

B. Validation of planetary nature of transit signals

1. High angular resolution imaging using adaptive optics to resolve potential binary or higher order multiple systems, which might mimic a transiting system.
2. RV measurements at a sensitivity of 1-2 m/s to eliminate a variety of stellar systems and to determine masses of intermediate mass planets.

C. Observation of secondary transits in the infrared.

It is mandatory that a letter (email) from Dr. Magali Deleuil endorsing the proposal as part of the broad CoRoT follow-up campaign be included in each submission.

Data processing and Proprietary Period

The proposal should describe in detail any data reduction techniques needed to achieve the goals of the program, e.g. high precision radial velocity measurements. The proposer should explicitly describe the relevant expertise of his/her team in reducing the data sought in the proposal. Data obtained with the High Resolution Echelle Spectrometer (HIRES) will be proprietary until 12 months after the end of the duration of each proposals (up to 4 semesters) at which time it will be released to the community via the Keck Observatory Archive (KOA).

Evaluation Criteria

The proposals will be evaluated on the following criteria:

1. Demonstrated understanding of the scientific context and theoretical background of the science goals of the program, eg. how an improved statistical knowledge of the incidence of planets of various sizes and orbital parameters informs our understanding of formation and evolution of planetary systems or how physical characteristics of transiting planets can be related their formation and evolution.
2. Demonstrated knowledge in the efficient use of the requested technique(s) to validate transit candidates or to characterize transiting planets and detailed justification for the number of nights requested on each instrument and the number of semesters for the total project.
3. Description of a plan using other telescope resources to filter out obvious false positive candidates (low resolution spectroscopy or coarse imaging) so as to maximize the scientific return of the Keck Telescopes by concentrating on those candidates requiring the full power of a 10-m telescope.
4. Description of an integrated plan to accomplish proposal goals involving both US team members and members of the CoRoT Exoplanet team. Clear roles should be identified for all team members.

Proposal Specifications

Proposers should follow the same guidelines as those for the general call as outlined in the [Application Procedures](#) section except that these Key Science proposals may contain up to 4 pages of scientific justification and 2 pages of figures and tables. Target lists including approximate coordinates (at a level sufficient to ensure appropriate scheduling within a semester) must be included. The endorsement letter (e-mail) from the COROT project may be included as a separate attachment.

Additional Information

CoRoT mission homepage: <http://smc.cnes.fr/COROT/>

V. Publication Acknowledgement

All publications based on data acquired with the Keck telescopes should include an acknowledgement in the form: "Data

presented herein were obtained at the W.M. Keck Observatory from telescope time allocated to the National Aeronautics and Space Administration through the agency's scientific partnership with the California Institute of Technology and the University of California. The Observatory was made possible by the generous financial support of the W.M. Keck Foundation." Please send a citation for any paper using this acknowledgement to Dr. Dawn Gelino (dawn@ipac.caltech.edu).

VI. Target of Opportunity Proposals

The NASA TAC will consider target-of-opportunity proposals at any time. However, proposers should bear in mind that target-of-opportunity observations are very difficult to schedule and will usually require rescinding the allocation of an already-scheduled NASA observer. Consequently, a target-of-opportunity proposal should be submitted only in the case of a truly extraordinary opportunity that could not have been anticipated prior to the regular proposal deadline.

Letters of intent for target-of-opportunity proposals (separate from the notices of intent noted below) may be sent by e-mail, FAX, or surface mail to:

Dr. Zlatan Tsvetanov
Keck Observatory Program Scientist
Astrophysics Division
Science Mission Directorate
NASA Headquarters
300 E St., SW
Washington, DC 20546□
Phone: 202/358-3810
zlatan.tsvetanov@nasa.gov

Dr. Dawn Gelino
NASA Exoplanet Science Institute
770 S. Wilson Ave., MC 100-22
Pasadena, CA 91125
Fax: 626/397-7181
dawn@ipac.caltech.edu

VII. Application Procedures

Notice Of Intent

In order to determine a rough volume and topic range of proposals, we request that you send a notice of intent to KeckCFP@ipac.caltech.edu by August 15. The notices are not binding and not required in order to propose for 2009A time. The letter should state the PI name and institution, intended review panel, number of desired nights, and desired instrument. Feel free to copy and use the template below:

I plan to apply for 2009A NASA Keck Telescope time. I understand that this notice of intent is non-binding and in no way obligates me to submit a proposal.

PI Name:

PI Institution:

Intended Topic: (Choose One: ExoPlanet, Solar System, Stellar/Galactic, Extra-Galactic, CoRoT Key Science)

Approximate Number of Desired Nights:

Desired Instrument:

Multi-semester status: Y/N

Applications Procedures

To submit your proposal, please follow the guidelines outlined on the [Application Procedures](#) page, and submit your proposal via the [online submission page](#). Proposals are due on September 8, 2008 at 4pm PDT.

Proposal Support

NASA will financially support the programs assigned time through this call for proposals. Principal investigators of programs assigned time will receive limited research and travel funding. Funding awards will be determined through formulaic means. NExSci will manage the Keck PI Data Awards and will contract with the Jet Propulsion Laboratory (JPL) to administer the disbursement of most of the funds. The funding instrument used by JPL will in most cases be in the form of a Research Support Agreement (RSA) depending on the size of the award and the nature of the Principal Investigator's home institution. An RSA is a simple Fixed Price, Advance Paid, subcontract provided through JPL that is

used for basic research funding where scientific reports and technical data are the only deliverables and can be awarded to educational and non-profit institutions. JPL is unable to issue grants. Proposers should not include any budget information in the proposal.

The only reporting necessary for RSAs is a final "end of contract" report outlining the work done and listing publications from the research. This report is not optional.

VIII. General Announcements

For a complete description of available instruments, see the [W.M. Keck Observatory: Observing at WMKO](#) page. Note that all data taken with the High Resolution Echelle Spectrograph (HIRES) has a default proprietary period of 18 months and is then released to the community via the Keck Observatory Archive (KOA). Requests for extensions of this period MUST be included as part of the proposal and justified scientifically. All extensions must be approved by the NASA selecting official, NExScI Director Dr. Charles Beichman.

Web Curator and NExScI Cognizant Official: [Dr. Dawn Gelino](#)

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