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NATIONAL SCIENCE FOUNDATION
1800 G STREET, N.W.
WASHINGTON, D.C. 20550
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LIGO-L900012-00-M


Dr. Rochus E. Vogt
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Dear Robbie:

The National Science Board has approved the site selection procedures and criteria outlined in the attached memorandum. Therefore, it is now appropriate for you to initiate the process of selecting sites following these guidelines.

It is important that the Foundation be kept fully informed at all stages of this important task, and I know that you will continue, as always, to work closely with the Physics Division throughout the process.

Sincerely yours,



Richard A. Isaacson
Program Director for
Gravitational Physics

Enclosure

NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550



OFFICE OF THE
DIRECTOR

MEMORANDUM TO MEMBERS OF THE NATIONAL SCIENCE BOARD

SUBJECT: Site Selection for the Laser Interferometer Gravitational-Wave Observatory (LIGO)

There is transmitted herewith for the review and approval of the National Science Board a proposed process and criteria for selecting sites for the Laser Interferometer Gravitational-Wave Observatory. Construction of the LIGO was approved by the National Science Board on May 10, 1990. The NSF has been supporting R&D to establish the feasibility of the LIGO since 1975.

OBJECTIVES

The LIGO requires interferometer installations of 4-km arm length along with support facilities. These installations will be located at two widely separated sites in the continental United States and will operate in coincidence for the detection of gravitational waves. These sites will be chosen after issuing a site solicitation announcement to inform the public of the opportunity and requirements for the proposal of potential LIGO sites. The LIGO team will evaluate all sites proposed as a result of this solicitation, as well as sites previously discussed as potentially suitable, in order to identify the best available location for this unique national facility. As part of this process, the LIGO team may contact other federal, state and local governmental organizations to include consideration of available land under their control and management.

LIGO will be used for research into the nature of gravity, and it will open up an entirely new observational window onto the universe. The observatory will be operated as a user facility, open to the national community for research at the frontiers of physics and astronomy, and will become part of a planned worldwide network of gravitational-wave observatories. The LIGO project is a joint effort of scientists at the California Institute of Technology and the Massachusetts Institute of Technology and includes collaborative programs with scientists at Stanford, University of Colorado, and other institutions.

SITE SELECTION PROCESS

The LIGO project will place the LIGO site solicitation announcement in the *Commerce Business Daily* (at least 90 day response time). All proposals received as a result of the solicitation will be considered together with other sites on public lands identified as meritorious by the LIGO team. All will be evaluated using the following procedure:

1. The Director of the LIGO project will appoint a committee to evaluate all site candidates for technical suitability according to the Site Selection Criteria. This evaluation will be based upon the submitted proposals (or available documentation for previously identified meritorious sites), but may also involve site visits, if necessary, for the purpose of obtaining needed technical information. This will result in a documented analysis of each site candidate's performance relative to these Site Selection Criteria.
2. The technically suitable sites will be sorted into compatible site pairs. These will be evaluated using the Site Selection Criteria. The LIGO team will submit a written analysis to NSF for preliminary approval.
3. The LIGO team will continue technical characterization, address environmental issues, and explore details connected with possible transfer of the sites considered most appropriate by NSF.
4. The LIGO team will submit its final analysis and recommendations for a set of site pairs to NSF for approval.
5. The LIGO team will arrange final transfer of the top ranked site pair.

SITE SELECTION CRITERIA

The sites chosen should permit the highest level of research productivity and overall effectiveness for the LIGO facility, at a reasonable cost of construction and operation, and with minimal adverse impact on the environment. Proposals will be evaluated against both technical requirements and cost considerations, using the following criteria:

1. Science Impact
 - (a) Local Parameters
 - i. Site topography affecting LIGO facility critical parameters (angle between arms, arm length, slope of arms).
 - ii. Natural and man-made ground vibration spectra.

(b) Global Parameters

- i. The two-site requirement.
- ii. Distance between sites.
- iii. Relative alignments of U.S. sites.
- iv. Geometry (location and alignment) of site triplets: Two U.S. sites and one European site.

2. Construction Cost Impact

- (a) Topography (required earth movement)
- (b) Soil and subsurface conditions
- (c) Hydrology and drainage
- (d) Climate
- (e) Environmental restrictions
- (f) Accessibility (roads, rail, etc.)
- (g) Site utilities installation (power, water, sewage, etc.)
- (h) Proximity of soil waste and borrow areas
- (i) Local labor costs

3. Site Availability and Acquisition Costs

4. Existing Support Infrastructure

- (a) Accommodations for resident staff (housing, schools, shopping, etc.)
- (b) Accommodations and access for visiting staff (lodging, transportation, etc.)
- (c) Local technical support (vendors, maintenance, fabrication, etc.)

5. Operations Cost Impact

- (a) Cost of power
- (b) Cost of local labor
- (c) Heating and cooling requirements
- (d) Maintenance requirements
- (e) Travel time and costs for visiting staff

6. Risk Factors

- (a) Environmental risks (earthquakes, floods, windstorms)
- (b) Potential future man-made noise from development

7. Security of Facility and Access for Visiting Staff

8. Local Contributions

- (a) Site acquisition
- (b) Construction
- (c) Operations
- (d) Other financial or in-kind contributions

RECOMMENDATION

I recommend that the Board approve the LIGO site selection process and criteria in accordance with the following resolution:

RESOLVED, that the National Science Board approves the process and criteria to be used for selection of sites for the Laser Interferometer Gravitational-Wave Observatory (LIGO), as described in *NSB-90-63*, and authorizes the Director to take final action on grants, contracts, or other arrangements necessary to secure the acquisition of suitable sites.



Frederick M. Bernthal
Acting Director