

SUMMARY OF NOVEMBER 1986 NSF REVIEW

The following is a copy of the title page and Summary from "Report to the National Science Foundation by the Panel on Interferometric Observatories for Gravitational Waves," which was submitted to NSF in January 1987 after a one-week (November 1986) review of the LIGO Project.

Report to the National Science Foundation

by the

Panel on Interferometric Observatories for Gravitational Waves

January 1987

5. SUMMARY

A) A strong case has been made for the scientific value of the goals of the project.

B) Though there are large uncertainties associated with the strengths of the many different kinds of astrophysical sources and the ultimate capability of interferometric detectors, there is a high probability that this facility will ultimately provide for a giant leap in our understanding of the gravitational force, one of the most fundamental forces of nature, as well as our knowledge of astrophysical phenomena.

C) It is anticipated that this facility would uniquely provide the most sensitive and certain prospect for detecting astrophysical events and identifying their nature. Essential to this capability is the twin nature of the two interferometers. Though companion efforts in other countries are highly desirable, a common management of the two LIGO detectors is important both for the coordination of the observational program and for the analysis and identification of observed events. This facility would provide for a continued and thriving development of the field.

D) It is important to proceed directly to the construction of a long baseline interferometer in a timely manner since many aspects of the detector development program cannot otherwise be tested.

E) The rate of detectable extragalactic events increases as the cube of the interferometer sensitivity, thus putting a high premium on the long baseline. Though a multistage, or phased authorization to the final configuration was carefully considered, the panel does not recommend this approach. We recommend full authorization with phased construction and appropriate milestones.

F) The plans as described in the presentations and in the various documents provided appear to be well conceived. The procedure which has been employed in drawing up the existing designs and in making the cost estimates appears reasonable and adequate for proceeding to the final design for submission. Effort should continue to examine design alternatives which may decrease costs, particularly in the area of the vacuum system and enclosure. We do not recommend that the project be delayed by this process of re-examination. It is important to make the choice between Fabry-Perot and Michelson interferometer type detectors before submission of the final design. However, it remains important to develop advanced detectors and therefore research should continue to this end.

G) Because of the magnitude and dual nature of the facility, with laboratory sites widely separated, it is especially important that the construction and operation be well managed. The panel feels that the project requires a single scientific project leader of high stature to direct the activities. Efforts should immediately be directed to providing such leadership.

H) In looking forward to the utilization of the facilities it should be recognized that in addition to a budget for its operation, adequate funds will be required to support both the needs of experimental groups and further detector development.

I) In conclusion, the panel enthusiastically supports this development effort and urges that the plans for the project be refined along the lines indicated and that the design be completed. We recommend, then, that the construction project be brought to the National Science Foundation Board for consideration and (hopefully) for funding.

Panel Members:

Daniel B. DeBra
Val L. Fitch
Richard L. Garwin
John L. Hall

Boyce D. McDaniel
Andrew M. Sessler
Saul A. Teukolsky
Alvin A. Tollestrup