

Memorandum of Understanding
between the
National Astronomical Observatory of Japan TAMA Group (NAOJ-TAMA)
and the
Laser Interferometer Gravitational Wave Observatory (LIGO) Laboratory
July 1, 1999

The purpose of this Memorandum of Understanding is to establish and define a collaborative relationship between the National Astronomical Observatory of Japan TAMA Group (NAOJ-TAMA), and the Laser Interferometer Gravitational Wave Observatory (LIGO) Laboratory. Both parties to this agreement share the goals of observing gravitational radiation and subsequently using gravitational radiation as an astrophysical probe. This agreement is intended to further these joint goals.

1. The National Astronomical Observatory of Japan TAMA Group (NAOJ-TAMA) is a gravitational wave detection group consisting of Yoshihide Kozai, Masa-Katsu Fujimoto, Seiji Kawamura and other members. NAOJ-TAMA's research focus is investigation of the Resonant Side Band Extraction technique and its potential for use in the future generations of advanced LIGO-type detectors.

The National Astronomical Observatory of Japan is the Inter-University Research Institute for astronomical research in Japan, providing advanced observational facilities to researchers throughout Japan, organizing a variety of joint-research projects and serving as a facilitator of international cooperation. The National Astronomical Observatory of Japan's scientific scope ranges from geodesy to radio astronomy and includes the research and development of gravitational-wave detectors.

The TAMA Project, Japan is a gravitational wave detection group consisting of the following institutions: National Astronomical Observatory (NAO); The Institute for Cosmic Ray Research (ICRR); The University of Tokyo; Institute for Laser Science (ILS); High Energy Accelerator Research Organization (KEK); the Yukawa Institute of Theoretical Physics (YITP); Osaka University; and Miyagi University of Education. The TAMA Project is constructing TAMA 300, a 300 m Fabry-Perot recombined interferometer with a power recycling system. The goal of TAMA 300 is to detect gravitational waves, and to that end, the design sensitivity is $h_{\text{rms}} = 3 \times 10^{-21}$ at 300 Hz.

2. The Laser Interferometer Gravitational-Wave Observatory (LIGO) Laboratory is aimed at opening the field of gravitational-wave astrophysics through the direct detection of gravitational waves. LIGO detectors will use laser interferometry to measure the distortions of the space between free masses induced by passing gravitational waves. The design, construction,

and operation of LIGO is being carried out by scientists, engineers, and staff at the California Institute of Technology (Caltech) and the Massachusetts Institute of Technology (MIT).

Caltech has prime responsibility for the project under the terms of a Cooperative Agreement¹ with the National Science Foundation (NSF). LIGO will become a national facility for gravitational-wave research, providing opportunities for the broader scientific community to participate in detector development, observations and data analysis. LIGO welcomes the participation of outside scientists at any of these levels. LIGO is being constructed in a phased approach beginning with one three-interferometer detector system and evolving to a multiple interferometer configuration to enable simultaneous use by several gravitational-wave observation systems.

3. In entering into this Memorandum of Understanding, the LIGO Laboratory will carry out its responsibilities following the requirements of the Cooperative Agreement¹.
4. The LIGO Laboratory is responsible for obtaining NSF approval of all collaborative Memoranda of Understanding with international partners, or involving NSF costs exceeding \$100,000. All Memoranda of Understanding will be provided to NSF for their information.
5. Each party to this agreement continues to be responsible for all support of its staff including travel costs associated with the activities under this agreement. Exceptional support of travel by the other institution may be allowed for travel requested by that institution.
6. This Memorandum of Understanding will remain in force until the parties mutually agree to terminate it. A semi-annual Attachment will define specific activities to be carried out during the following year.

Approved:

Barry C. Barish

Barry Barish
LIGO Laboratory Director

Yoshihide Kozai

Yoshihide Kozai
NAOJ-TAMA Principal Investigator

June 27, 1999

Date

July 7, 1999

Date

1. Cooperative Agreement No. PHY-9210038 between the National Science Foundation, Washington, D.C. 20550 and the California Institute of Technology, Pasadena, CA 91125, dated May 1992.