

Tsubono Group

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The detection of gravitational waves is expected to open a new window into the universe and brings us a new type of information about catastrophic events like supernova or coalescing binary neutron stars which can not be obtained by other means such as optics, radio-waves or X-ray. Worldwide efforts are being continued in order to construct detectors with sufficient sensitivity to catch possible gravitational waves. Now the detection of the gravitational waves is one of the biggest challenges in the field of physics and astronomy. In U.S.A. LIGO(Laser Interferometer Gravitational-Wave Observatory) project is in progress under the collaboration of Caltech and MIT. Also in Europe French-Italy collaboration team has started the VIRGO project; they are constructing 3-km interferometer in Pisa, Italy.

In Japan we are constructing a 300-m arm-length laser interferometer (TAMA300) in Mitaka. The main purpose of this project is to establish techniques necessary for future kilometer class detector. Moreover, it will be operated to catch possible gravitational waves from nearby galaxies. It will play an important role in the international network of the gravitational wave detection. The project is in progress under the collaboration of several universities and institutes. We have already finished the construction of the tunnels and the buildings to hold the vacuum pipes and vacuum chambers. We are now installing the optical system of the interferometer into the vacuum chamber. From next year we plan to start the operation of the interferometer to obtain the first data of the possible signals. At the University of Tokyo, we are mainly engaged in the study of the vibration isolation and the control of the laser interferometer. Using a 3-m prototype laser interferometer in our laboratory we are developing techniques of alignment control, fringe control, mirror suspension, recycling scheme and so on. Next Japanese project of a 3-km interferometer is under planning.

References

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