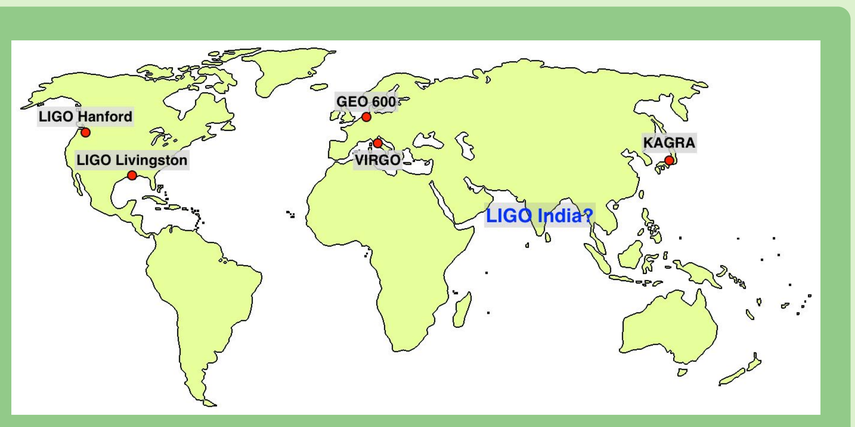
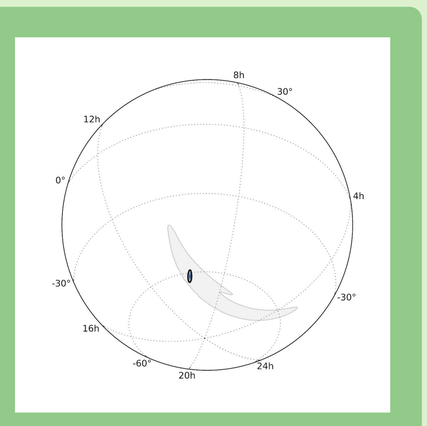
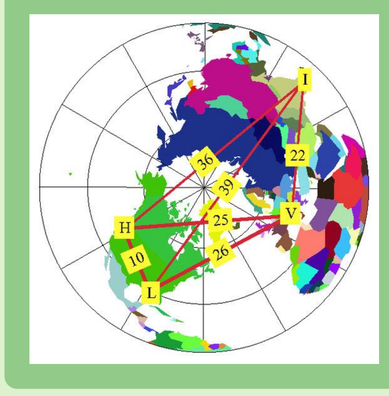
LIGO India



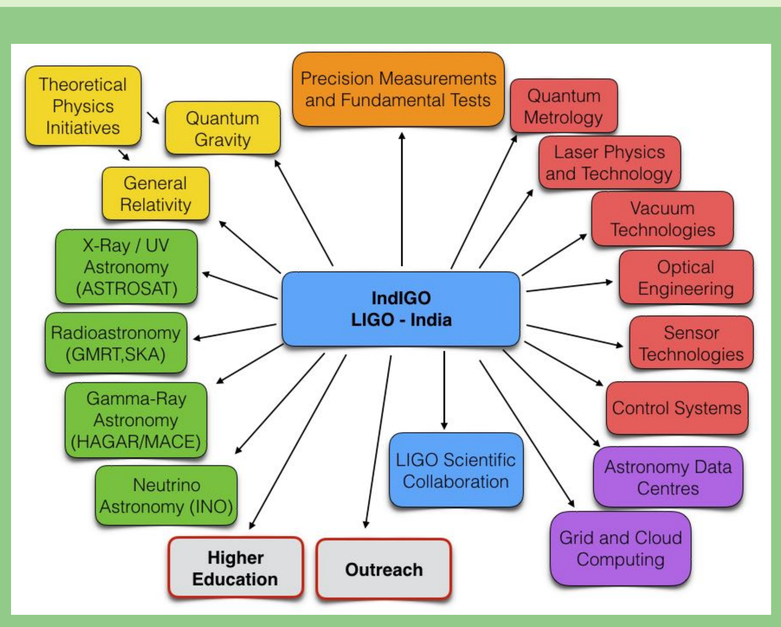
Currently there is a worldwide effort to set up a global gravitational wave detector network. With collaboration with LIGO lab Indian scientists have proposed to build a state of the art gravitational wave detector on Indian soil.

The scientific benefits of LIGO-India are enormous. Adding a new detector to the existing network will increase the expected event rates, and will boost the detection confidence of new sources (by increasing the sensitivity, sky coverage and duty cycle of the network). But the dramatic improvement from LIGO-India would come in the ability of localizing GW sources in the sky. Sky-location of the GW sources is computed by combining data from geographically separated detectors ('aperture synthesis').





This strategic advantage of India is geography since a detector here will far be from the countries with existing detectors.
Addition of LIGO India will enormously improve the network by providing a number of long baselines in the network.



LIGO India will not only provides an advantage to the international gravitational wave community and bring India to the vanguard of gravity research, it has multidisciplinary benefits on India's astrophysics research, high end technological development and human resource development in general.Since most of the components will be made in India it will improve the technological expertise of Indian scientists and engineers.

To minimise the noise from terrestrial sources the interferometers must be built in a place where earthquakes are least likely. Turns out that the Deccan plateau in India is one of the most seismically quiet zones in the world.

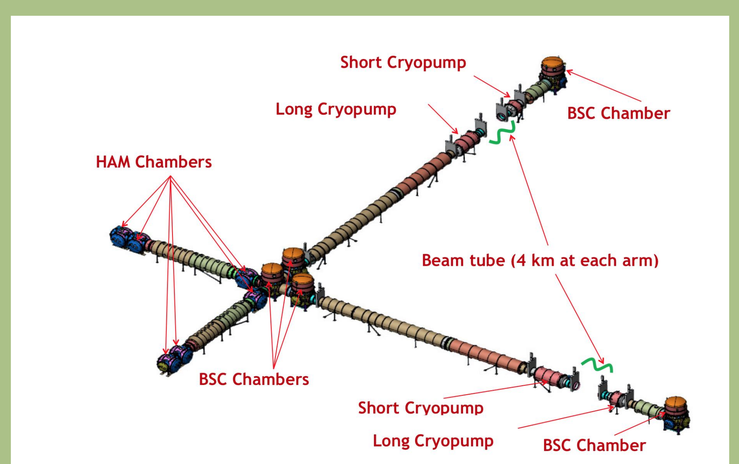
With collaboration of Indian Seismic Survey. A list of the most seismically QUIET zones of India were identified. After detailed study using data from ISRO's CARTOSAT which can map the earth surface with the special resolution of 2.5 meters, a few sites were short listed. The contribution of IISER Kolkata in the site analysis is notable. Later a detailed map and specification of the most favourable constructions was prepared by TATA Consultancy Services.

The major operations required for LIGO India has been broken down and been distributed among the three lead institutes IPR, IUCAA and RRCAT. (full forms of the other two and location, Gandhinagar & Indore)

Institute of Plasma Research

1. Civil Infrastructure and Facilities
2. Vacuum System & Mechanical Engineering
3. Implementation CDS Systems

IPR has conceptualised the basic infrastructure design for LIGO-India laboratory. IPR has completed all the vacuum related drawings (Figure 2) along with their critical dimensional tolerances. The jigs and fixtures concept for BSC and HAM have also been completed. All the comments given by LIGO-US have been incorporated and final set of drawings have been communicated to the LIGO-US and also uploaded to LIGO-DCC website.



LIGO - INDIA Conceptual Design Layout of Vacuum System

Inter-University Centre for Astronomy and Astrophysics

1. Site selection and survey
2. Data analysis and Computing facility
3. Science and Human Resource Development

Current IUCAA data centre: (oper. Jan 2013) 30Tf , 600 Tb [10Tf for GW]
GWDA centre: ~100Tf, 2400 cores (LSC Tier2 level): Hardware arrived, installation in progress
Future Tier-1 LIGO data centre post LIGO-India operations
All infrastructure for future expansion to ~500 Tf in place

Raja Ramanna Centre for Advanced Technology

1. Detector Hardware Documentation & Pre-installation
2. Optics & 3rd generation R&D
3. Detector integration, installation and commissioning

In anticipation of the Project approval RRCAT has initiated setting up of the requisite training infrastructure for the interferometer-detector installation and commissioning, programs towards development of ultra precise optics and ultra-stable laser systems and an off-site facility for staging and testing of the detector components being shared by the LIGO Labs.