

India-Based Neutrino Observatory

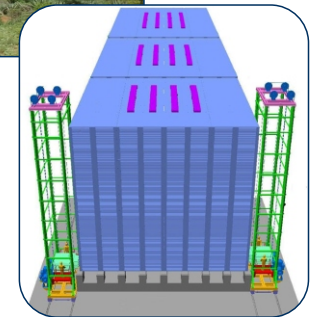
www.ino.tifr.res.in

At a Glance:

- *Boon for student community with active outreach programs and interactions with international scientists.*
- *Limited prospects for employment of local people by way of services especially during the construction phase.*
- *Marginal land requirement, about 34 ha, most of which will be Poromboke land.*
- *No displacement of people.*
- *No requirement of over-ground forest land.*
- *No cutting of trees.*
- *No toxic wastes and effluents.*
- *No generation of hazardous radiation.*
- *No degradation of land, water or air quality.*



Prototype detector at TIFR.



- *200 Scientist and Engineers*
- *30,000 Resistive Plate Chambers*
- *50 kilo-ton Iron*
- *3 Million Electronic Channels*
- *World's Largest Magnet*
- *Large Industry Interface*



About the Project:

The India-based Neutrino Observatory (INO) Project is the brain child of scientists from nearly 25 Research Institutes and Universities in India with Tata Institute of Fundamental Research (TIFR), Mumbai, as the host institute. The observatory is devoted to the study of the properties of Neutrinos, the elusive elementary particle about which little is known. Just as a Telescope observes the sky through visible light, INO will enable scientists to observe the sky through neutrinos. These neutrinos are produced in the Sun and other stars, and in our own atmosphere. In fact, there are neutrinos even from the birth of the Universe.

This ambitious project will construct the world's most massive magnetized detector for neutrinos. The detector will consist of active detector elements called Resistive Plate Chamber (RPC) sandwiched between Iron plates. An RPC consists of two 2m x 2m glass plates placed on top of each other, separated by a gap of 2mm. The sides will be sealed and the gap, filled with an environment friendly gas. The detector is being completely developed indigenously. The project is estimated to cost around Rs. 900 Crores. It is unique in concept, involving many educational and research institutions and extensively involving industry as well.

Neutrinos:

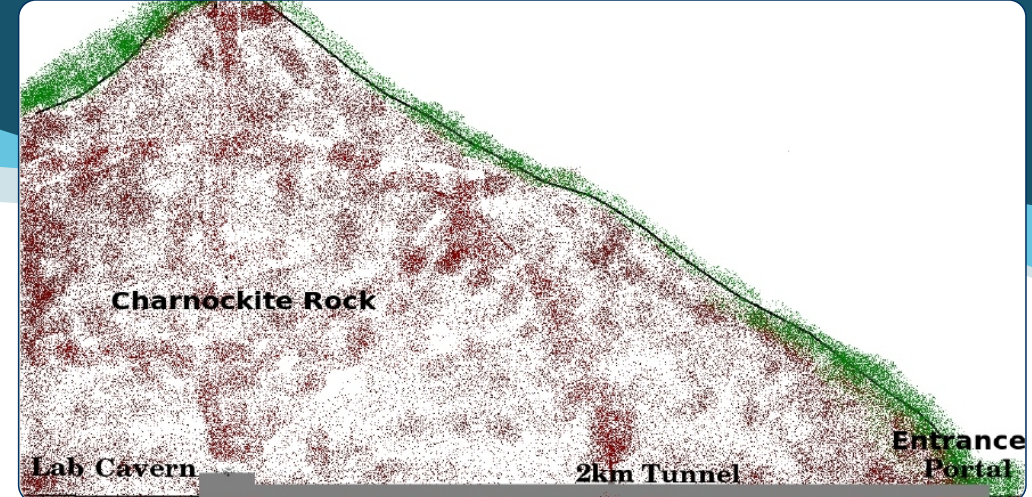
Neutrinos are elementary particles. They naturally occur in great abundance on Earth and have a tiny but unknown mass. The proposed Observatory will enable scientists to study the properties of neutrinos, which in turn would enable a deeper understanding of various processes in our Universe.

In spite of their presence in copious numbers, neutrinos are difficult to detect except in an environment free of particles such as Cosmic rays and other natural radiation that are already present on the Earth's surface. A radiation-free environment can be created only if the detectors are shielded by more than 1000 meters of rock mass. Hence, neutrino observatories are set underground, situated in deep mines or in special man-made caves inside tall mountains.

At present, there are four underground neutrino observatories functioning in the world in Sudbury in Canada, Kamioka in Japan, Gran Sasso mountains in Italy and Soudan mines in USA.

Site:

INO project envisages two man-made caves in a mountain to house the observatory's detector.



The steep slopes with geologically stable and dense rocks found in the mountains of Western Ghats of Tamil Nadu are ideal for locating the caves. Geologists and scientists consider the West Bodi Hills near Pottipuram in Theni District as a suitable site. Access to the caves cut deep inside the mountain will be through a horizontal tunnel of about 2 km length. A large cavern (26 m (width) x 30 m (height) x 132 m (length)) will house the detector and a smaller cavern will house the control systems.

Execution:

The project is expected to take about five years for execution. When completed, it will provide opportunities for about 200 scientists and students to participate in experiments. Only about 30 personnel will be located at the site at any given time.

Impact:

The INO project is very important for the development of Indian Physics. It is well-poised to provide great opportunities for achieving scientific success at the International level. Internationally, there is great support for and expectation from this project.

The location of INO in Tamil Nadu is expected to provide an impetus and a platform for the local student community to participate in hands-on research in a world-class laboratory. In fact, colleges and Universities in neighboring areas as well as from all over India can interact freely with scientists from all over the world.

We look forward to the active and enthusiastic support of all sections of the local community in realizing this objective in a time-bound and effective manner. Only with your help can we achieve success.