

Neutrino Observation

What is the issue?

\n\n

People from several walk of life fear about the proposed Indian Neutrino Observatory project in Tamil Nadu due to lack of awareness.

\n\n

What are neutrinos?

\n\n

\n

- The only particle other than gravitational waves that can zip through the universe at speeds very close to that of light are called neutrinos. \n
- The biggest nuclear reactor that most life on earth derives energy from is the sun.
- Like all nuclear reactors, in addition to giving out energy (heat and light), the sun also emits neutrinos.

\n

\n\n

What is Standard Model?

\n\n

\n

- All the laws and forces of nature that we know of, other than gravitation, are described by what physicists call the Standard Model. \n
- It predicted that neutrinos, which come under three types or flavours tau-neutrino, electron-neutrino and muon-neutrino — would not oscillate from one flavour to another.

\n

- The discovery that they do meant that the Standard Model or the basic laws of physics had to be further modified. \n
- Thus, through the neutrino detectors we are actually observing the fundamental laws of physics at the cutting edge. \n

\n\n

What INO will do?

\n\n

∖n

- The proposed India-based Neutrino Observatory (INO) aims to observe muon neutrinos that are continuously produced in the atmosphere when cosmic rays strike the earth. $$\n$
- Since every type of matter particle has an anti-matter partner particle associated with it, there are also anti-neutrinos that the INO can observe. \n
- Anti-neutrinos also come in three flavours and can oscillate from one to the other.

\n

The INO, by observing the rates at which neutrinos and anti-neutrinos oscillate, will make a substantial contribution to the quest to unravel the secrets of the ultimate laws of physics.

\n\n

Is there anything to fear?

\n\n

\n

• There are some baseless allegations that the INO, which is just like a telescope, causes radioactivity and have compared it with the dangers of having a nuclear power plant or radioactive material in the neighbourhood.

∖n

• This cannot be true since the neutrinos are very feeble and weakly interacting particles that we can't even see or feel without the help of an observatory.

\n

• Beams of neutrinos are being sent to the NOvA neutrino detector in the

U.S. and to the T2K neutrino detector in Japan every day. $\slash n$

- Moreover, being the lightest matter particles, the neutrinos do not decay into any other particles, as everything else is heavier. \n
- So they are not like uranium which decays radioactively into smaller atoms. $\space{1.5mm}\sp$
- All the INO would do is to provide the lens to observe neutrinos as they are too feeble or faint to be detected by the naked eye. \n

\n\n

\n\n

Source: The Hindu

\n

