

GOVERNMENT OF INDIA
DEPARTMENT OF ATOMIC ENERGY
LOK SABHA
UNSTARRED QUESTION NO.624
TO BE ANSWERED ON 20.11.2019

INDIAN PARTICIPATION IN GLOBAL PARTICLE PHYSICS EXPERIMENTS

624. DR. SANJAY JAISWAL:

Will the PRIME MINISTER be pleased to state:

- (a) The extent of Indian participation in global particle physics experiments like Belle 2 of Japan and the intended benefits of such projects;
- (b) whether India plans to have its own project on the lines of particle accelerator of CERN;
- (c) If so, the details thereof;
- (d) the project implementation status of the neutrino observatory being established in Tamil Nadu; and
- (e) The steps taken to ensure that the project is environmentally safe and the expected benefits of the project?

ANSWER

THE MINISTER OF STATE FOR PERSONNEL, PUBLIC GRIEVANCES & PENSIONS AND PRIME MINISTER'S OFFICE (Dr. JITENDRA SINGH):

- (a) The following are the Global Particle Physics Experiments in which Department of Atomic Energy (DAE) in partnership with Department of Science and Technology participate :
 - i. Particle Physics Experiments at the Large Hadron Collider (LHC) accelerator at CERN. The extent of participation covers developing of hardware and software for the ATLAS and CMS detectors at the LHC, and in theoretical analysis of the results. Benefits include: development of detector technology; Indian authorship in publication of results emanating from the LHC; training of students in detectors and analysis.
 - ii. Proton Improvement Plan-II (PIP-II) accelerator at Fermilab, USA. India, along with other international partners, is involved in design and development of various sub-systems of the PIP-II Accelerator. Benefits that will accrue from this collaboration include: transfer of High Intensity Superconducting Proton Accelerator (HISPA) technology know-how to India; setting up of infrastructure and facilities for developing HISPA components; development of expertise in HISPA design and technology; training of our scientists and engineers in HISPA technology; development of capability in Indian industry in this high technology area.

- iii. Belle and Belle II experiments of Japan to unravel mysteries of nature by colliding electrons with positrons at the highest possible luminosity. The main goal of the Belle II phase is to exploit the billions of beauty hadrons (sub-atomic particles containing a beauty quark) produced in electron-positron collisions in order to make precise measurements and search for super-rare decays towards probing the next fundamental layer of physics. We have succeeded in training a large pool of next-generation scientists.
- iv. Facility for Antiproton and Ion Research (FAIR) accelerator is coming up at Darmstadt, Germany. 43 Indian Groups (11 from DAE labs) are participating in this project. It has High Intensity beam(1000x) and Primary High Intensity beam (10000x) for radiation ion beams and 100x for antiproton beams. The project is under construction, wherein eight countries are participating while three countries have shown interest to join. Indian interests are in :-
 1. Nuclear Structure Astrophysics and Reactions(NUSTAR) – Nuclear Physics Research
 2. Quantum Chromo-dynamics (QCD)- Community active in high energy nuclear physics.
 3. Atomic Plasma Physics and Applications(APPA) - Atomic, plasma and laser community interest.

India is supplying few of the important components for this project. Power convertor(ultra stable power connectors) are being manufactured at ECIL. Some of them have already been dispatched.

(b)&(c) No, Sir.

(d)&(e) The INO project is in the process of getting the Wildlife Clearance(WLC) from the National Board of Wildlife, MoEF&CC. Based on recommendations by the Tamil Nadu Wildlife Authority, INO Project Director has applied for Building Clearance (BC) at the Bodi West Hills site of the underground laboratory. The Environmental Clearance has already been obtained. WLC and BC clearance from the Tamil Nadu Pollution Control Board is sought.

The INO project does not disturb the ecosystem around the site and does not release any radiation, as it does not have any radioactive substance. INO project is an ambitious basic sciences research project aimed at studying the properties and interactions of the elusive elementary particles called neutrinos. Neutrinos are naturally occurring particles and at any given moment huge quantity of neutrinos pass through earth including our body. As neutrinos do not interact with our body, it causes no radiation damage. This project is aimed to study scientifically the behaviour of neutrinos and is considered internationally one of the most important studies in this field.
