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Looking into nature

Some of nature's deepest mysteries lie locked away in the realm of the small. And the small is the key to understanding the big. The biggest object we know, our universe, originated in a dimensionless point with an incredibly energetic explosion that we call the 'Big Bang'. Over the next 14 billion years, it evolved into the complex form we observe today, with hundreds of billions of galaxies with hundreds of billions of stars in each, on an average.

In the realm of science, as we make increasingly accurate observations of the cosmos, we find that the trail to understanding leads inexorably backwards in time, to the first few seconds of the birth of the universe. This is when matter first made its appearance in the form of fundamental particles — as did the fabric of space and time that we live and work in today. Our quest compels us to understand the way matter and energy interacted and evolved during that short span.

One of the most interesting and important of the fundamental particles of matter is the neutrino. With a mass that is incredibly tiny compared to the other fundamental particles, and with interactions that are much weaker, it occupies a special place in our quest for understanding the universe. But it is extremely difficult to detect. Studying the properties of neutrinos is crucial to science's struggle to build a complete theory of forces and matter.

A step towards this goal is the proposal to build the Indian Neutrino Observatory (INO). If built, it would be India's biggest basic science project. A collaboration of scientists spread over 25 universities and research institutes has proposed housing a massive 50,000-tonne iron detector deep inside a mountain in the Nilgiris, at Singara, Tamil Nadu. For strong scientific reasons, this is the best site for the project.

The INO would be the biggest detector of its kind in the world. It has been cleared for joint funding by the Departments of Atomic Energy and Science and Technology, and included as a Mega-Science project in the Eleventh Five-Year Plan. However, the project is held up as there has been no reply from the Tamil Nadu Forest Department to INO's 2006 application for permission to begin construction.

Conservationists have objected to INO for its proximity to the elephant and tiger habitat at Singara. The proposed location is 7 km from the edge of one of the six sanctuaries in the Nilgiri Reserve. The collaboration is sensitive to this, and all efforts will be made to construct INO with minimal invasion. Not a single tree will be felled and no new roads need to be built. There is an existing Tamil Nadu Electricity Board (TNEB) campus at Singara, and INO will be located on the TNEB land. Water and electricity are all already available. A tunnel 2 km long and a large cavern need to be constructed to house the experiment under the mountains. There will be no radioactivity or pollution, and no noise other than when the first 200 metres of rock are cut away. Thus, the INO constitutes a small addition to an existing TNEB establishment that already has 13 km of tunnels and auxiliary caverns in use.

The INO project has expressed its commitment to respect the biodiversity and sanctity of the Nilgiri Reserve. An environmental management plan has been drawn up. During the construction phase, there will be movement of material due to iron being brought in and rock debris being moved out. Since there is an elephant movement corridor 2 km from the project site, all truck traffic will cease from November to February, when this movement peaks, to allow undisturbed passage for elephants.

Our quest for understanding the mysteries of nature would lose its worth if conducted in a manner that's not in harmony with nature. If nothing, the study of science inspires, in those who attempt it with sincerity, a deep sense of humility and an appreciation for nature's inner harmonies.

This alone, perhaps, should instil faith that the INO will attempt to achieve its goals by walking, with respect, alongside our precious reserves of tiger and elephant, and not by riding on their backs.

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The views expressed by the author are personal.

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