

TIFR gives nod to build prototype GW detector

Move Set To Widen Technical Frontiers In The Country

TIMES NEWS NETWORK

Pune: It is a major step forward for the Indian gravitational wave astronomy, as the Tata Institute of Fundamental Research (TIFR) has given the green light to build a prototype gravitational wave (GW) detector.

Sanjeev Dhurandhar, spokesperson for the Indian Initiative in Gravitational-wave Observations (IndIGO) consortium, said, "For the past couple of decades I, along with collaborators, have been engaged in active research in GW data analysis, and also been a part of the prestigious Laser Interferometer Gravitational-wave Observatory (LIGO) and Virgo science collaboration which is responsible for frontline fullscale detectors." The LIGO is in the United States of America while the Virgo is in the Europe.

The IndIGO consortium consists of 26 scientists who are at the helm of worldwide gravitational wave research and belong to leading institutions at home and abroad. Besides Dhurandhar, T Souradeep and R. Gupta from Inter-University Centre for Astronomy and Astrophysics are in the IndIGO consortium. IUCAA-IndIGO members will be involved in science aspects of the 3-metre enterprise.

The most enigmatic prediction of Einstein's theory of relativity are ripples in the fabric of space-time-gravitational waves. Dhurandhar explained, "The detector is "L" shaped having two four-km

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long arms, at the end of which there are two mirrors suspended in such a way that they are isolated from any external disturbances. A laser beam is made to bounce off these mirrors which then measures minute differences in armlengths. A gravitational wave produces minute changes in the armlengths indicating their presence."

So far, there has been no direct detection of GW due to their weakness, but their existence has been established by observing the decay in the orbit of the Hulse-Taylor binary pulsar — fetching the Nobel prize to Hulse and Taylor in 1993.

"These detectors give us a chance of observing the waves as it were. The waves will open up an unparalleled window for observing cosmic and astrophysical phenomena occurring in the universe launch-

ing a new astronomy — gravitational wave astronomy. In fact, the detection of GW would provide a direct proof of the existence of black holes," Dhurandhar informed.

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According to Dhurandhar, "The next important phase, the signing of the memorandum of understanding between the IndIGO consortium and the Australian Consortium for Australian Gravitational-wave Astronomy (ACIGA), is imminent. This will be a significant step, because very recently, the National Science Foundation (NSF) of the US has approved the proposal to build one of its LIGO detectors in Australia at Gingin about 100 km from Perth with an additional 170 million dollars expected from Australia. Australia, in turn, is seeking international partners, in particular India, with its two decade legacy in GW."

The IndIGO-Australian MOU will promote Indian participation in this world-class project with technology pushed to its limits in various aspects, such as, laser optics, vacuum technology, computing among others.