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Prototype of gravitational wave detector on cards, to aid study

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INDIAN gravitational wave astronomy has taken one step closer to studying gravitational waves, which may be able to provide direct evidence for the existence of black holes as a prototype is being built of a gravitational wave detector. The project is being carried out by Tata Institute of Fundamental Research (TIFR).

Sanjeev Dhurandhar of IUCAA, also the spokesperson for the IndIGO (Indian Initiative in Gravitational-wave Observations) consortium explained, "So far there has been no direct detection of GW due to their weakness, but their existence has been established by the observing the decay in the orbit of the Hulse-Taylor binary pulsar."

For the past couple of decades Dhurandhar and his collaborators have been engaged in active research in GW data analysis. The three metre instrument is being built by CS Unnikrishnan and his group at TIFR and is the first step in a phased approach leading to a full fledged GW experiment.

The detector is 'L' shaped having two four-km long arms, at the end of which there are two mirrors suspended in such a way that the mirrors 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.

The IndIGO consortium consists of 26 scientists. Besides Dhurandhar, T. Souradeep and R. Gupta from IUCAA are in the IndIGO consortium. IUCAA-IndIGO members will be involved in science aspects of the three metre enterprise.

The next important phase, the signing of the MoU 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 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 worldclass project with the technology pushed to its limits in various aspects.