## 10th International Conference on Gravitation and Cosmology: New Horizons and Singularities in Gravity (ICGC 2023)



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## Gravitational Wave Detectors (India): Present status & future plans

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Gravitational Waves are the periodic stretching and contracting of space-time produced by rotating astrophysical objects possessing a finite quadrupole moment such as binary stars, binary neutron stars, neutron star-black hole binary or black-hole-black-hole binary, etc. A passing gravitational wave will modulate the distance between two inertial test masses albeit by a very miniscule amount. Gravitational waves can be detected by measuring these minuscule changes using techniques such as resonant bars, resonant spheres, interferometric measurement, etc. Of these the interferometer detector is most promising due to it broadband sensitivity and scalability in size. The Michelson interferometer is a 39;natural39; detector of gravitational waves because of the differential changes in its two orthogonal arms induced by the quadruple field of the gravitational waves. As the displacement of two mirrors separated by a distance L, scales with the distance interferometer detector with arm length of kms is required to be able to detect Gravitational waves. Two such km class detectors are the Laser Interferometer Gravitational-wave Observatory (LIGO) detectors in the US, located in Livingston, Louisiana, and Hanford, Washington, separated by about three thousand kilometers. The third detector labeled LIGO-India is being setup in India under a joint collaboration between NSF and DAE-DST. The talk will provide a brief overview of the LIGO-India Project, it's current status and plans for it's upgrades to "arrive" in the global network of Gravitational Wave Detectors with an optical configuration similar to the other two LIGO detectors. The various activities on the Indian side for the LIGO-India Project will be presented in detail. The activities and plans for contributing to the next generation Gravitational Wave detector and a possible deci-Hz Gravitational Wave detector in space will also be discussed briefly.

Presenter: RAJA, Sendhil

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