



TUNING INTO 'COSMIC HUM': THE FIRST HINTS OF A STOCHASTIC GRAVITATIONAL WAVE BACKGROUND

DR. PRATIK TARAFDAR
IMSc Chennai



ABSTRACT

The first direct detection of gravitational waves was made by the LIGO-Virgo collaborations in 2015. Such spacetime ripples with wavelengths of the order of kilometres are generated during the final few milliseconds of stellar mass black hole or neutron star mergers, beyond which their strength falls below our present instrumental sensitivity. However, continuous gravitational wave emissions had been predicted in colliding galaxies from supermassive black hole binaries (SMBHB) revolving around each other for years before the ultimate merger. Superposition of such emissions from a large number of SMBHBs is expected to create a persistent stochastic gravitational wave background (SGWB) with wavelengths of the order of light years (in nano-Hz frequencies). Detection of such a background requires detectors with light-year arm lengths that cannot be achieved by ground-based or even the advanced upcoming space-based gravitational wave detectors. Thankfully, nature has gifted us ultra-precise galactic clocks placed light years apart named 'millisecond pulsars' as potential tools to detect these nanohertz gravitational waves. Recent results announced by the Indian Pulsar Timing Array (InPTA), the European Pulsar Timing Array (EPTA), the North American Nanohertz Observatory for Gravitational Waves (NANOGrav), the Parkes Pulsar Timing Array (PPTA) from Australia, and the Chinese Pulsar Timing Array (CPTA), unravel the first strong direct hints of such a cosmic gravitational wave background.

DATE

22 February, 2024

TIME

03:00 PM

VENUE

PAMU Seminar Room



*Everyone is invited to
attend*