PRESS RELEASE

InPTA FIRST DATA RELEASE

The Indian Pulsar Timing Array (InPTA) announced its first official Data Release (InPTA DR1), published by the Publications of the Astronomical Society of Australia. The InPTA is an Indo-Japanese collaboration of about forty radio-astronomers working together with the International Pulsar Timing Array (IPTA) towards the detection of low-frequency gravitational waves. This data release stems from three and a half years of observation using the upgraded Giant Metrewave Radio Telescope (uGMRT) operated by NCRA-TIFR, Pune. The uGMRT can conduct simultaneous multiband observations with receivers recording in parallel. This feature grants InPTA the unique strength to measure interstellar electron densities with the highest precisions obtainable as yet. It is a critical addition to the PTA consortium's combined data pool.

The detection of gravitational waves (2017 Nobel Prize in Physics) in 2015 heralded a new era of gravitational wave astronomy. Gravitational waves detected so far have resulted from the final phases of a stellar-mass black hole or neutron star mergers. The frequencies of such signals range from tens to hundreds of cycles per second, lasting only for thousandths of a second. But certain black holes can grow to millions or even billions of times the solar mass. Orbiting pairs of such 'supermassive black holes (SMBH) can generate very low-frequency gravitational waves beyond the detectable ranges of earth-based or future space-based detectors.

Measurement of fine delays in the arrival times of radio pulses from old revived pulsars called millisecond pulsars (MSP), is the technique being pursued by the PTAs to detect background gravitational waves propagating in the intervening medium. MSPs are the best natural timekeepers. Any remnant delay in their incredibly periodic radio pulses after compensating for known delay effects should carry imprints of the yet undetected tiny ripples in spacetime - the nanohertz gravitational waves. But there's a catch! These random fluctuations are difficult to model. The only way out is to measure them with as high precision as possible. That is precisely what the InPTA has been able to achieve. With millisecond pulsars as our probes, we measure the noise produced by the changing medium between us, so that together with the other PTAs, we can listen to the symphony of black holes in the universe." In addition to the global hunt for low-frequency gravitational waves, the first InPTA data release also forms the basis of recent findings and ongoing investigations by the Indo-Japanese alliance. As a combination of data amongst various PTAs gets underway, anticipations fly high to discover nanohertz gravitational waves in the near future.

InPTA
Indian Pulsar Timing Array

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HUNT FOR NANOHERTZ GRAVITATIONAL WAVES