

PRESS RELEASE

IIT Hyderabad joins India's global hunt for Einstein's waves from monster black holes

The Indian Pulsar Timing Array (a consortium of Indian institutes based mainly at NCRA-TIFR, TIFR(Mumbai), RRI, IISc, and IITH) joined the global Pulsar timing array collaboration to search for nanoHz Gravitational waves.

Hyderabad March 27, 2021: An Indian initiative, Indian Pulsar Timing Array (InPTA), formally joined IPTA as a full member. InPTA is a collaboration of currently about 25 research scientists and students from 15 institutions in India and abroad. Dr. Shantanu Desai, Associate Professor, Dept. of Physics, Mr. Raghav Girgaonkar (BTech in Engineering Physics) and Mr. Ashwin Pandey (BTech in Mech. Engg.) are currently part of this prestigious collaboration from IIT Hyderabad. The collaboration also includes one IITH alum, Mr. Suryarao Bethapudi (BTech Engg. Physics, batch of 2018), and currently a PhD student in MPIFR, Germany. InPTA uses the uGMRT, operated by the National Centre for Radio Astrophysics of Tata Institute of Fundamental Research, for monitoring about 6 to 20-millisecond pulsars since 2015.

Recently, this consortium of mainly Indian researchers which regularly employs the upgraded Giant Metrewave Radio Telescope (uGMRT), situated near Pune, became a full member of the international effort to discover and study very low-frequency gravitational waves from monster black holes going around each other in orbit.

The largest radio telescopes in the world are routinely being used by an international experiment, called International Pulsar Timing Array (IPTA), to precisely measure the clock periods of a collection of these radio pulsars. The unique frequency range of the uGMRT, which is the largest steerable radio telescope at low radio frequencies, is helping to improve the precision of IPTA to detect nanohertz GWs. When discovered, these waves will refine evolutionary models of our universe as well as masses and orbits of members of our solar system and open a new window of GW astronomy. These clocks are observed between 300 - 800 MHz with the uGMRT, which is not covered by other big IPTA telescopes. The inclusion of uGMRT will allow removing the delays introduced by the interstellar medium in the arrival of radio pulses from these Galactic clocks by a factor of 5 more precisely than before, which should be crucial to improve the precision of IPTA. Therefore, the InPTA and the uGMRT are likely to play significant roles in the detection of nanohertz GWs and gravitational astronomy with these waves in future.

Highlighting the significance of this achievement, Dr. Shantanu Desai, Associate Professor, Dept. of Physics, said, "IITH has been part of the Indian Pulsar Timing array since 2017. Our students participate in the data collection using the unique capabilities of the uGMRT and are playing an important role in ongoing data analysis in partnership with NCRA-TIFR. Now that we are part of the global international effort to search for nanoHz gravitational waves, it provides plenty of opportunities for IITH students from science as well as engineering backgrounds to join this global effort to join this search and make ground-breaking discoveries. Moreover, IITH's participation in the detection of nanoHz gravitational waves would make it a premier institute for astrophysics and cosmology. I look forward to working with more IITH students across various departments on InPTA and participate in these monumental efforts."

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About IIT Hyderabad

Indian Institute of Technology Hyderabad (IITH) is one of the six new Indian Institutes of Technology established by the Government of India in 2008. In a short span of **12** years, the institute built on an imposing **578**-acre campus and has been ranked among the top **10** institutes for four consecutive years in the NIRF released by the Ministry of Education, GoI. IITH was also ranked under Top **#20** in the recent edition ARIIA on indicators related to 'Innovation and Entrepreneurship Development' among students and faculties. IIT Hyderabad has close to **237** full-time faculty, **3,397** students of whom **20** per cent are women, nearly **200** state-of-the-art laboratories and five research and entrepreneurship centres. The Institute has a strong research focus with more than Rs. **500** crore of sanctioned research funding while PhD scholars account for about **30%** of total student strength. IITH students and faculty are at the forefront of innovation with more than **1,500** research publications and patent disclosures, **300** sponsored/ consultancy projects and **50** industry & academic collaborations.

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