

IIT-Indore to 'carry forward' NASA project

Institute leading construction of a prototype to be installed at Ladakh



IIT Indore

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The Indian Institute of Technology-Indore (IIT-I) is going to build a prototype instrument that would be installed at Ladakh, according to institute Director Pradeep Mathur's report released, on Saturday.

Dr Siddharth Savyasachi Malu, a faculty of IIT-Indore, in collaboration with senior astrophysicists at the University of Wisconsin-Madison (Prof. Peter Timbie) and the University of Manchester (Prof. Lucio Piccirillo) would build the prototype.

As part of a long-term NASA project to design, construction and commission of the next-generation satellite to probe the origins of the cosmos, the abovementioned three-member team had designed a prototype instrument in 2007.

"Now, the IIT Indore is leading the construction

of the next prototype to be installed at Ladakh," the director's report said.

Dr Malu is also part of the astrophysics satellite project of the institute. The IIT Indore has a plan to construct a satellite with the help of ISRO and to position it at 1.5 million kilometer away from the Earth.

Apart from this, the institute has a series of international joint projects.

Dr Neeraj Mishra and Dr Pritee Sharma of IIT Indore are part of the Ganga Health Project, an international consortium being spearheaded by IIT Kanpur to come up with strategies to environmentally protect one of the country's largest river systems. The river Ganga has the most heavily populated basin in the world - approximately 400 million people - which happens to be more than a third of country's population.

The consortium plans to

develop infrastructure in order to provide ecological services to the river and to transfer technology for ecological protection to different localities in the river basin.

● Dr Sudeshna Chattopadhyay has received a fellowship from the Deutscher Akademischer Austausch Dienst for collaborative work with Prof Uwe Klamradt of the RWTH Aachen University on confinement induced structural change in polymeric template. Her work will address critical problem concerning the control of structure at the nanometric length scales - reproducible control of patterns.

● Dr Ankhi Roy is collaborating with Forschungszentrum Juelich GmbH Germany COSE-FFE on studies of omega meson decays with wide angle shower apparatus - at COSY, which is addressing one of the key issues in the physics of fundamental particles.

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The Indian Institute of Technology Indore is poised to take a major leap in research field. It has taken up some major research initiatives that would put the institute on global map. Senior faculty members of the institute are working on the projects day and night.

Following are some major research initiatives by the institute.

MoU with CERN for construction of detector

The institute signed an MoU with ALICE Collaboration, a CERN experiment, in May. The purpose of the MoU is construction, maintenance and operation of ALICE detector. The CERN is running the largest experiments in the world - the recently discovered Higgs Boson (God Particle) is a testament to the continued success of the CERN pro-

grammes. Dr Raghunath Sahoo and Dr Ankhi Roy are heading the IIT Indore efforts in experimental particle physics in the ALICE experiment. Dr Ankhi Roy also heads the institute section of the PANDA collaboration, another fundamental particle probe, which aims to understand the nature of quantum Chromodynamics, the theory strong interactions.

Energy storage for the future

Dr Sudeshna Chattopadhyay is developing novel techniques to figure out ways to design and fabricate materials that can efficiently store and deliver energy. Dr E Anil Kumar is working on novel methods to trap and store heat energy. Besides, Dr Shaikh Mobin investigates single crystals to single crystal reversible/irreversible transformations involving processes such as vapor, diffusion, photochemical process. These find ready applications in

testing for alcohol, for instance. Also, Dr M Anbarasu investigates phase-change materials that may be utilised for memory applications. Applications of phase-change materials are not limited to flash memories, though. Fast-switching modulators with a wide variety of applications are being explored.

Medical diagnosis

New methodologies for analysis and classification of bio-signals like electroencephalogram (EEG), electrocardiogram (ECG), center of pressure (COP) and phonocardiogram (PCG) for medical diagnosis are being aimed at the IIT Indore. Epileptic seizures, human emotions, cardiac disorders etc are being examined and analyzed using signal processing. Lab of Dr Ram Bilas Pachori is working on signal analysis.

Astrophysics Satellite

The results of two galaxy

clusters, mission of light years across, at 10 million degrees, clashing into each other at 5000 km/s and resulting in the biggest bangs in the universe that dwarf supernova. Such clashes attracted the attention of the institute that has planned to build a satellite with the help of ISRO. Dr Siddharth Savyasachi Malu is working on the project. The IIT Indore's first radio telescope, which is part of the project will see the first light in August, the use of embedded systems at 5, 10, 14 GHz is a novel feature. In five years, the institute will have an array of 30 dishes.

Networks and their dynamics

Complex systems and chaos have been difficult to characterize. Dr Sarika Jalan's group has demonstrated that viewing complex systems as networks and inter-relationships and dynamics between elements of networks leads to a novel understanding of behavior

of these systems. This can lead to predictive power for complex systems, leading to significant impact on the design and construction of networks. This is achieved through random matrix theory. Besides, Dr Mohan Shanthakumar is working on robotics projects at his lab in the institute.

Optimal Drug Delivery

Cancerous and tumorous growths need to be treated with drugs as well as radiation. The effectiveness of drug delivery in surgery as well as chemotherapy depends on the model of drug delivery used. Dr Chelvam Venkatesh optimises these drug delivery methodologies. Meanwhile, members of biosciences and bioengineering interdisciplinary research group at IIT Indore is conducting research on a variety of topics that have urgent and immediate applications in the biomedical field.

Research initiatives: From CERN to the Universe