Department Of Instrumentation and Appied Physics Seminar Series

Seeing Biochemistry in Action: Imaging Real-Time In Vivo Metabolism using Magnetic Resonance

Date: 13th Jan 2026 **Time:** 2:30PM **Venue:** SVN Auditorium

Abstract: Metabolism underlies nearly every biological process, from neuronal signaling and muscle contraction to cancer progression and immune response. Despite its central role in health and disease, observing metabolic activity in real time within living organisms remains a fundamental scientific challenge. Magnetic resonance (MR), traditionally associated with structural imaging, provides a unique and non-invasive window into in vivo biochemistry by directly probing molecular spins and their interactions.

This talk presents an overview of real-time in vivo metabolic imaging using magnetic resonance techniques, with emphasis on magnetic resonance spectroscopic imaging (MRSI), hyperpolarized carbon-13 imaging, and deuterium metabolic imaging (DMI). The underlying spin physics, signal generation mechanisms, and fundamental sensitivity constraints are discussed. Through selected examples spanning glucose metabolism, energy pathways, and representative applications, the presentation highlights how advances in hardware, pulse sequence design, and AI-assisted signal processing are transforming MR from a static imaging modality into a powerful tool for functional and metabolic investigation of living systems.

KESHAV DATTA, HEAD OF NMR DSP AND AI AT SYNEX, CALIFORNIA

About the Speaker

Keshav Datta, Ph.D., an alumnus of IAP, IISc, is a scientist and technology leader specializing in magnetic resonance spectroscopy, signal processing, and biomedical imaging. He has held senior R&D and executive leadership roles in medical imaging and AI-driven healthcare companies, where he led the development of FDA-cleared imaging technologies and digital biomarkers. Dr. Datta is a co-author of the textbook Fundamentals of In Vivo Magnetic Resonance (Wiley, 2024). His current interests focus on translating research innovations into commercially viable technologies that can be deployed in real-world clinical and healthcare settings. He holds a Ph.D. and M.S in Electrical Engineering from Stanford University, M.Sc. (Engg.) from IISc, and B.Tech. from IIT Madras.