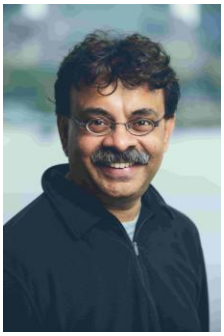
MATHEMATICS, PROOFS AND COMPUTATION

SPECIAL COLLOQUIUM BY PROF. MADHU SUDAN



VENUE : Lecture Hall AG 14, Prefab Building,

UM-DAE Centre for Excellence in Basic Sciences, University of Mumbai, Kalina Campus.

DATE: January 7, 2016

TIME: 4.00 – 5.00 PM

ABSTRACT: While it is well-understood that Proofs form the foundations of Mathematics, it is less well-known that Proofs and Computers are intimately related. Indeed a common perception is that the only link between Proofs and Computing is that sometimes computers can assist in the search for proofs. In this talk I will describe a more historically significant, and intrinsic, connection. Proofs are by definition "Computational Objects" - and to understand to the difference between a theorem and its proof, one needs to understand computational complexity of tasks - namely the number of steps on a computer needed to solve a given task. In this talk, I will talk about the historical role of proofs in computation, leading to the "prototype" of the modern computer in the 1930s, to the conception of the famous "Is P = NP?" question in the 1970s and some modern variation like interactive proofs, zero-knowledge proofs and probabilistically checkable proofs. I will explain how at each stage the study of proofs has revolutionized our understanding of what computers can or can not do!

ABOUT MADHU SUDAN (http://madhu.seas.harvard.edu/)

Madhu Sudan was educated at IIT Delhi and UC Berkeley. At present, he is Gordon Mckay Professor of Computer Science at Harvard University. His research lies in the fields of computational complexity theory, algorithms and reliable communication. He is best known for his works on probabilistic checking of proofs, and on the design of list-decoding algorithms for error-correcting codes. His current research interests include semantic communication and property testing.

In 2002, Madhu Sudan was awarded the Nevanlinna Prize, for outstanding contributions to the mathematics of computer science, at the International Congress of Mathematicians in Beijing. For his fundamental work on probabilistically checkable proofs he was awarded ACM's Distinguished Doctoral Dissertation Award in 1993 and the Gödel Prize in 2001. He is a fellow of the ACM, the IEEE, the AMS and the American Academy of Arts and Sciences. In 2014 he won the Infosys Prize in the mathematical sciences. Recently, he has been offered the Jubilee Professorship of the Indian Academy of Sciences.