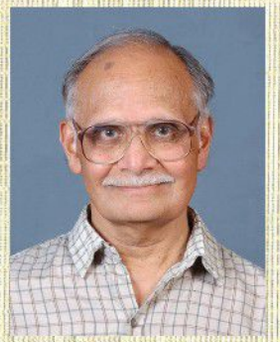
Brief Biography of Professor A. P. Balachandran



Professor Aiyalam Parameswaran Balachandran is an Indian theoretical physicist, well known for his outstanding contributions towards the understanding of the role of classical topology in quantum physics. He has been the Joel Dorman Steele Professor of Physics in Syracuse University (now emeritus) since 2000. He has also been a fellow of the American Physical Society.

Prof. Balachandran was born on 25th January 1938 in Salem, Tamil Nadu. After his early education at *Madras Christian College* (Chennai), he joined the Institute *of Mathematical Sciences, Chennai* affiliated to *University of Madras* for research and received his Ph.D degree in 1962 under Professor Alladi Ramakrishnan. Afterwards he joined *Theoretische Physik, Universitaet Wien* as a post-doctoral fellow under Professor Walter Thirring. Subsequently he joined the *Enrico Fermi Institute* for a second post-doctoral position. In 1964, he was offered faculty position at *Syracuse University.*

Prof. Balachandran's key scientific contributions to date include the revival of the Skyrme model which successfully describes baryons as topological solitons of meson fields and mathematical concepts such as homotopy groups and fibre bundles to problems in quantum physics. In recent years his research work has been focused on the formulation of quantum field theories on noncommutative spacetimes, investigating the emergent significance of Hopf algebras in quantum physics, as generalisations of symmetry groups, algebraic quantum field theory, and local quantum physics.

He has been a fellow of the American Physical Society and was awarded a prize by the U.S. Chapter of the Indian Physics Association in recognition of his outstanding scientific contributions. In 1990, *Syracuse University* honoured him with a *Chancellor's Citation for Exceptional Academic Achievement.*

Prof. Balachandran has authored more than 200 research papers and several well known books. He has supervised nearly 40 PhD students throughout his career, which includes a list of very prominent physicists like P. Ramond, V. P. Nair, F. Lizzi among many others.

BOSE-125 Distinguished Lecture

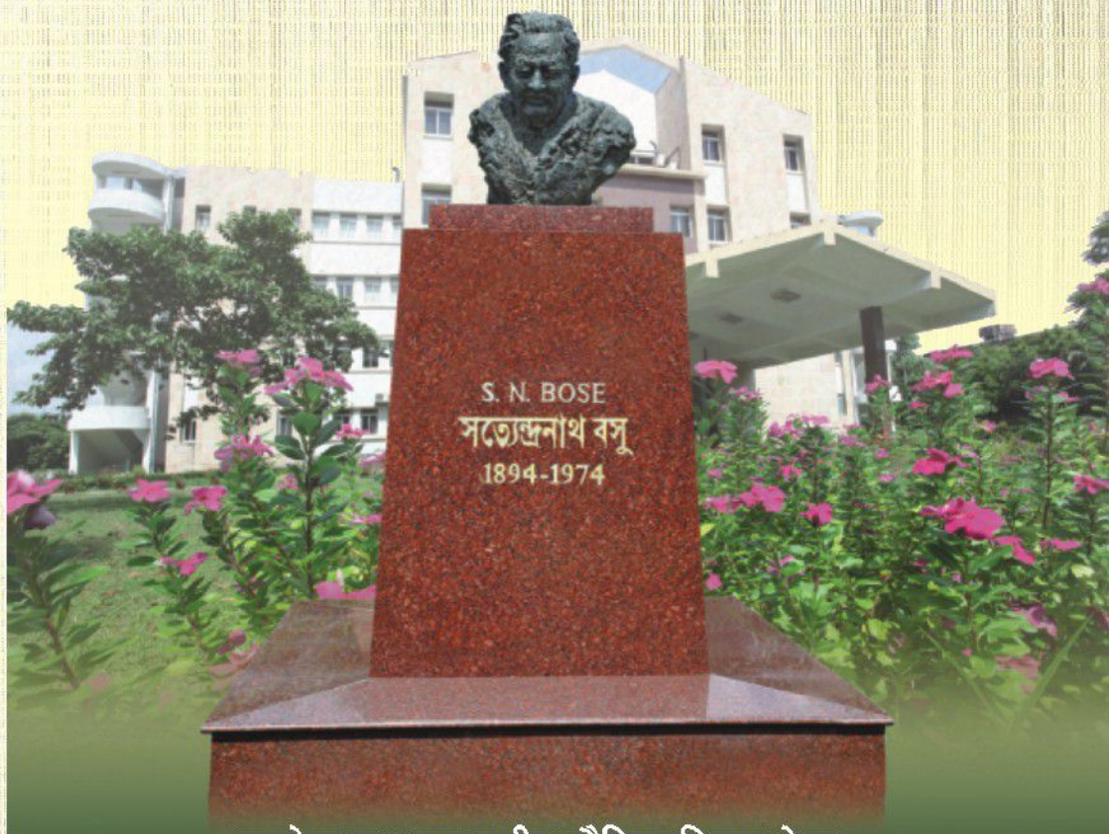
on

TWENTY SECOND NOVEMBER
2018

सत्येन्द्र नाथ बसु की 125 वीं जयंती

1894 - 2018

125th Birth Anniversary of Satyendra Nath Bose



सत्येन्द्र नाथ बसु राष्ट्रीय मौलिक विज्ञान केन्द्र

Satyendra Nath Bose National Centre for Basic Sciences

Algebraic Quantum Physics : Entanglement and Entropy

Professor A. P. Balachandran

ABSTRACT

Any physical theory is characterised by states which describe the system being observed and observables which account for the quantities that the experiment measures. The application of the state on the observable gives the mean value of the observable. From this point of view, classical physics can be described as the probability theory of commuting observables whereas quantum theory is noncommutative probability theory. The talk describes how the conventional Hilbert space emerges from this approach (the "GNS construction"). It then describes how entropy and entanglement can be treated in this approach. The entanglement entropy of identical particles whose treatment has been a long-standing problem is discussed as also the increase of entropy by a stochastic process for repeated measurements of certain generic quantum states. Applications of these ideas to quantum fields on curved backgrounds are also briefly described.

S. N. BOSE NATIONAL CENTRE FOR BASIC SCIENCES
KOLKATA

Director
and
Staff and students of S. N. Bose National Centre for Basic Sciences request the pleasure of your company at the

BOSE-125 Distinguished Lecture

by

Professor A. P. Balachandran
Joel Dorman Steele Professor of Physics in Syracuse University
(now emeritus)

on

Thursday, 22nd November, 2018 at 4:00 pm

to celebrate

125th Birth Anniversary of Professor Satyendra Nath Bose

Prof. Samit Kumar Ray
Director

Venue :
Silver Jubilee Hall
S. N. Bose National Centre for Basic Sciences
Block JD , Sector-III, Salt Lake City,
Kolkata - 700 106, India
Phone: +91-33-2335 1313/0312/3057/3061/5705/6/7/8
Web: www.bose.res.in