

## | Professor A. K. Sood : Brief Profile |



Prof. A.K. Sood, FRS is an Honorary Professor in Department of Physics at Indian Institute of Science, Bangalore. He is currently the President of the Indian National Science Academy and the Secretary General of The World Academy of Sciences (TWAS). He was the President of the Indian Academy of Sciences from 2010 to 2012. His research interests include Physics of Nano systems such as graphene and other 2D materials and soft condensed matter, with a strong focus on innovative experiments. The latter includes the flow behaviour such as rheochaos, nonequilibrium phase transitions, deconstruction of glass physics using colloid experiments, active matter and stochastic thermodynamics. The experimental probes used for exploring physics at nanoscale are Raman spectroscopy, Ultrafast time resolved spectroscopies including terahertz spectroscopy, transport measurements and X-ray diffractions. He has published close to 400 papers in referred international journals and holds a few national and International patents. His work has been recognized by way of many honors and awards. These include the Fellowship of the Royal Society (FRS), all the three science academies of India and TWAS; the civilian honor, Padma Shri by Government of India, S. S. Bhatnagar Prize, G. D. Birla Award, TWAS Prize in Physics, FICCI Prize, Goyal Prize, M. N. Saha Award and Millennium Gold Medal of Indian Science Congress, Sir C. V. Raman Award of UGC, Homi Bhabha Medal of Indian National Science Academy, DAE Raja Ramanna Award of JNCASR, National Award in Nanoscience and Nanotechnology by Government of India, Nano Award by Government of Karnataka, G. M. Modi Award of Science and R. D. Birla Award for Excellence in Physics by Indian Physics Association.



सत्येन्द्र नाथ बसु राष्ट्रीय मौलिक विज्ञान केन्द्र  
Satyendra Nath Bose National Centre for Basic Sciences  
Block - JD, Sector-III, Salt Lake, Kolkata-700 106



FIRST JANUARY  
2018

सत्येन्द्र नाथ बसु की 125 वीं जयंती

1894 - 2018

125<sup>th</sup> Birth Anniversary of Satyendra Nath Bose



सत्येन्द्र नाथ बसु राष्ट्रीय मौलिक विज्ञान केन्द्र  
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PROGRAMME SCHEDULE

Venue

S N Bose National Centre for Basic Sciences, Kolkata

- 11:15 hrs.

- Garlanding the bust of Prof. S.N. Bose
  - Tree plantation by Distinguished Guests
- 11:30 hrs.

- Curtain Raiser Ceremony of the Celebration of 125th Birth Anniversary of Professor Satyendra Nath Bose
  - Release of Special Cover on Prof. S.N. Bose by Department of Posts, Govt. of India
  - Reminiscences of Bose
  - Screening of documentary on Life and Works of Bose
- 12:30 hrs.

- Bose -125 Distinguished Lecture

**Prof. Ajay K. Sood**, FRS, President, INSA, IISc, Bangalore

*Title:* Nature Inspired Physics: Flocking and Bacterial Heat Engine
- 13:30 hrs.

- Inauguration of new Bose Archive and Museum
- 13:45-14:45 hrs.

Lunch



S N BOSE NATIONAL CENTRE FOR  
BASIC SCIENCES  
KOLKATA

Director

and

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

Curtain Raiser Ceremony

of

125<sup>th</sup> Birth Anniversary of Satyendra Nath Bose

and

BOSE-125 Distinguished Lecture

by

**Prof. Ajay K. Sood**, FRS

President, INSA

IISc. Bangalore

on

1<sup>st</sup> January, 2018

**Dr. Srikumar Banerjee**

Chairman, Governing Body and Formerly Chairman, Atomic  
Energy Commission of India, has kindly consented to  
preside over the programme.

**Prof. Samit Kumar Ray**

Director

**Venue:**  
S N Bose National Centre for Basic Sciences  
Block-JD, Sector-III  
Salt Lake, Kolkata - 700106, India  
Ph: +91-33-2335 5705/6/7/8  
Website: www.bose.res.in

BOSE - 125 Distinguished Lecture

Nature Inspired Physics: Flocking and  
Bacterial Heat Engine

**A.K. Sood**

Department of Physics,  
Indian Institute of Science, Bangalore 560 012, India.

| A B S T R A C T |

This talk will bring out how nature inspires us to explore fascinating phenomena like flocking, a self-organized motion of vast numbers individuals of same species in same direction. It is a common behavior seen in many animals like ants, locusts, birds, fishes etc. As a physicist, I along with my colleagues have tried to understand this beautiful phenomenon in the laboratory by working with inanimate polar granular objects made active by placing them on rapidly vibrating surface amongst spherical beads[1].

The conventional macroscopic heat engine, a device to convert thermal energy to mechanical energy, is a triumph of our understanding of classical thermodynamics over the last three centuries. In recent years, taking the heat engine concepts to microscopic scale, necessarily dominated by fluctuations, has led to the development of stochastic thermodynamics. We have shown that a micrometer-sized active Stirling engine can be realized by periodically cycling a colloidal particle in a time-varying harmonic optical potential across bacterial baths at different activities[2]. Our experiments bring out a message towards the fundamental insights into the functioning of engines operating out of equilibrium.

[1] Nitin Kumar, Harsh Soni, S. Ramaswamy and A.K. Sood, Nature Communications, 5, 4688 (2014), Cond. Mat. Arvix. 1603.08535, unpublished results (2017).

[2] Sudeesh Krishnamurthy, Subho Ghosh, Dipankar Chatterji, Rajesh Ganapathy and A.K. Sood, NaturePhysics 2, 1134 (2016) and unpublished results(2017)