

Institute Lecture

The Ribosome – restless molecular machine at the center of all life

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Abstract

In the cell, cyclic molecular machines are employed at many places, for instance in transcribing and copying DNA, in making and recycling proteins, and in the synthesis of ATP and GTP, the energy currency used to power many reactions. Ribosomes, in all living organisms, make proteins according to genetic instructions carried by messenger RNA. The ribosome is a large cyclic molecular machine of astonishing complexity, made up of several strands of RNA and at least 50 proteins. It has moving parts propelled by thermal motion and by energy freed up in GTP hydrolysis. While the structure of the ribosome was first determined in 2000 by X-ray crystallography, much of what we know now about its movements during its work cycle comes from single-particle cryo-electron microscopy (cryo-EM), the technique of visualization my lab specializes in. Following the recent advances in image recording, as the resolution of cryo-EM reached 3 Angstrom (0.3 nanometers) and better, it is now possible to decipher the detailed mechanism of action of this machine and the way it is controlled by the actions of special protein factors.

About the speaker

Prof. Joachim Frank is a Professor in the Department of Biochemistry and Molecular Biophysics, and in the Department of Biological Sciences of Columbia University, New York, USA. He has been honored with numerous prizes, the latest being the **Nobel Prize for Chemistry** in 2017 "for developing cryo-electron microscopy for the high-resolution structure determination of biomolecules in solution". Some of the other prestigious awards include Wiley Prize of Life Science, Franklin Institute Medal for Life Science, National Lecturer at the Biophysical Society's Annual Meeting, Scientific Merit Award for the 4th Quarter Century with the NYS Department of Health, Wadsworth Distinguished Scientist in Structural Biology, Howard Hughes Medical Institute Investigator Award, George E. Palade Distinguished Lecture and Gold Medal, Solvay Public Lecture etc. Some of the special lectures that he has delivered include Annual Max-Gruber Lecture, Max-Gruber Foundation, University of Groningen. The Netherlands. He is an Elected Fellow of the Biophysical Society, the American Academy of Microbiology, the American Association for the Advancement of Science, American Academy of Arts and Sciences, National Academy of Sciences USA.

Tea at 6.00 PM

All interested are welcome.

S. Ganesh
Dean of Research and Development, IIT Kanpur