



**S N BOSE NATIONAL CENTRE
FOR BASIC SCIENCES**

Block JD, Sector III, Salt Lake, Kolkata 700 106

DEPARTMENTAL SEMINAR

Physics of Complex Systems

09th January, 2023

3.00 PM

ONLINE / FERMION

SPEAKER

Dr. Suman G. Das,
Research Associate, Institute for Biophysics,
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TITLE OF THE TALK

Biological evolution on a driven disordered fitness landscape

ABSTRACT

Evolution is governed by fitness landscapes, which are defined as maps from the genotypes to the fitness of an organism. The fitness landscape depends on environmental parameters, and changing the environment alters the structure of the landscape. Motivated by empirical studies of antibiotic resistance under changing drug concentration, we have developed a model of a disordered fitness landscape which changes systematically as an external field is changed. The landscape is highly rugged at intermediate values of the field, i.e the number of fitness optima grows exponentially with system size. Nonetheless, we find that some special symmetries of the model lead to all fitness optima being accessible through strictly fitness-increasing paths from a large number of genotypes, in contrast to standard models of rugged landscapes. I will outline a proof of these and other related aspects of the landscape topography, and discuss their consequences for evolutionary dynamics under both constant and changing external field.

HOST FACULTY

Dr. Urna Basu, Assistant Professor
DEPT. OF PHYSICS OF COMPLEX SYSTEMS
