NANYANG TECHNOLOGICAL UNIVERSITY
SINGAPORE

SEMINAR ANNOUNCEMENT

Viruses and Geometry: New Insights into Virus structure, Assembly and Evolution

Prof. Reidun Twarock
University of York, UK

Date: 14 June 2017 (Wednesday)
Time: 11:00 am to 12:00 pm
Venue: MAS Executive Classroom 2, MAS-03-07
School of Physical and Mathematical Sciences

Abstract

Viruses are remarkable examples of order at the nanoscale. The capsids of many viruses, enclosing and protecting their genomes, are organised in lattice like arrangements with overall icosahedral symmetry. Mathematical techniques from group, graph and tiling theory can therefore be used to characterise their architectures. In this talk, I will introduce our mathematical approach to the modelling of viral capsids, and demonstrate its applications in vaccine design. I will then present our Hamiltonian path approach to the modelling of genome packing in RNA viruses that underpins the discovery of an RNA-encoded assembly instruction manual in a wide range of viruses, including Picornavirusus, Hepatitis C and Hepatitis B virus. Finally, I will introduce our models of virus assembly and demonstrate how they can be used to develop implicit fitness functions that shed new light on viral evolution and anti-viral drug therapy.

Speaker Biography

Reidun Twarock is Professor of Mathematical Biology at university of York. She got her B.S. in mathematics with distinction from Bath University in 1993 and her PhD in Mathematical Physics with distinction from Clausthal in 1997. She is the elected fellow of the Institute of Mathematics and its Applications (FIMA), Mary Cartwright Lecturer of the London Mathematical and the first female mathematician to deliver the Plancherel Lecture in Fribourg (Switzerland). She serves in the Research Policy Committee of the London Mathematical Society (LMS), Scientific Steering Committee of the Isaac Newton Institute for Mathematical Sciences, EPSRC Peer Review College and Strategic Advisory Teams in Mathematics and Healthcare, etc. Her research focuses on the development and application of novel analytical and computational tools to address open problems in virology. She has pioneered the area of Mathematical Virology, which uses group, graph and tiling theory in combination with biophysics, bioinformatics and computational chemistry to gain new insights into virus structure, assembly and evolution.

Host: Assistant professor: Kelin Xia
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