



Centre for Biosystems Science and Engineering Seminar

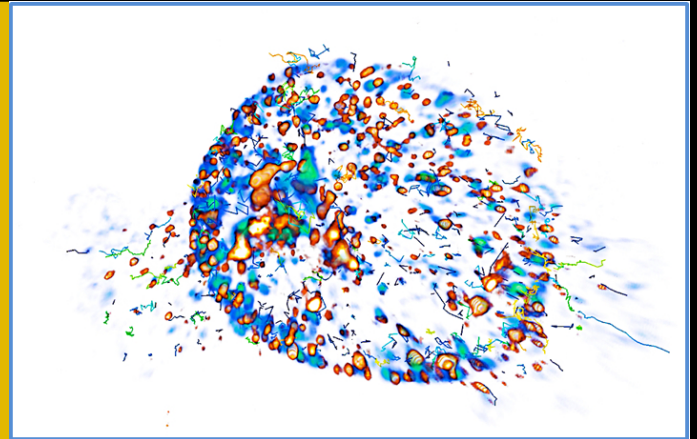
Mechanisms of Shiga Toxin clustering and entry into cells

4:00 PM, 6th June 2016,
Seminar Hall, MRDG, Biological Sciences Building.

Dr. Senthil Arumugam

Single Molecule Science Centre, University of New South Wales,
Sydney, Australia.

To infect cells, the shiga toxin interacts with the glycosphingolipid Gb3, followed by toxin internalisation and intracellular retrograde trafficking. The current model implies that toxin molecules cluster at the plasma membrane prior to their endocytic uptake into cells. This clustering also results in an alternative clathrin independent endocytosis. The mechanisms by which this clustering occurs remain poorly defined, notably in the absence of any indication for direct interactions between toxin molecules. The speaker will discuss evidence based on simulation and reconstitution experiments which shows membrane fluctuation-induced forces, known as thermal Casimir forces, generate an effective attraction between toxin molecules. Further, the speaker will describe how endocytic processes of Shiga toxin can be quantitatively visualized in gene edited SUM159 human cells using the newly developed lattice light-sheet microscopy (LLSM) based on ultrathin non-diffracting light sheets. Novel methodologies to quantitatively study distinct endocytic routes and clustering at the whole cell level using automated analysis will also be discussed.



About the speaker

Senthil studied chemistry and physics in his B.Sc and biology at Tata Institute of Fundamental Research, Mumbai, India, where he worked with Prof. Sudipta Maiti on advanced microscopy techniques for neuroscience. He then obtained his PhD from Technical University of Dresden and Max Planck Institute for Cell Biology and Genetics, Dresden, Germany, for studying bacterial cytokinesis machineries with Prof. Petra Schwille. Thereafter, he worked on mechanisms of Shigatoxin entry and transport with Prof. Ludger Johannes and Prof. Patricia Bassereau at the Curie Institute, Paris, France. During this period, he was also a visiting researcher in the labs of Tomas Kirchhausen (Harvard, Boston) and Melike Lakadamyali (ICFO, Spain). He starting his own group at the Single Molecule Science Centre at the University of New South Wales, Sydney in July 2016. His lab is interested in self-organization and self-assembly phenomena giving rise to sub-cellular organization of a living cell using advanced microscopy techniques and toxins and viruses as model cargoes.