ICTS Fluid Dynamics Seminar

Title : Soft matter quasicrystals: minimal recipes and new tools to analyse them

Speaker : Priya Subramanian (The University of Auckland, New Zealand)

Date : Wednesday, 25 June 2025

Time : 3:00 PM (IST)

Abstract : Regular patterns (made of tiles) and crystals (made of either atoms/molecules) surround us in everyday life. These patterns look the same when moved by one unit (translational symmetry) or rotated by certain special angles (rotational symmetry). Such repeating arrangements are prevalent in nature as lesser amount of energy is required to assemble them. Aperiodic patterns or quasicrystals are special as they possess long range order without translational symmetry. Quasicrystals have recently been observed in a variety of systems such as nanoparticles, metallic alloys and polymer solutions. This implies that under suitable conditions, quasicrystals require lesser energy to assemble than regular patterns. Considering the difference in scale between metallic and polymeric quasicrystals, there is a need for mathematical models which explore the unifying mechanisms that generate quasicrystals both on surfaces and in bulk.
This talk will explore minimal models to understand the formation of quasicrystals both in 2D and 3D, the existence of related spatially localised quasicrystals and how non-topological defects can get pinned to a patterned background. Time permitting, the rest of my talk will focus on my use of two new connections within mathematics that help explore and classify patterns. The first is the use of numerical algebraic geometry to obtain all equilibria with a chosen symmetry. The second is the need and use of topological data analysis to characterise obtained patterns quantitatively.

Venue : Feynman Lecture Hall
Zoom Link: https://icts-res-in.zoom.us/j/93297380061?pwd=C1bpRsIcsbcjHGwLvxkMaUcp9brTna.1
Meeting ID: 932 9738 0061
Passcode: 747270