



## ICTS Fluid Dynamics Seminar

**Title** : Designing block copolymers that can microphase separate to form stable quasicrystals.

**Speaker** : Merin Joseph (University of Copenhagen, Denmark)

**Date** : Friday, 3<sup>rd</sup> May 2024

**Time** : 11:30 AM (IST)

**Abstract** : Block copolymers have the ability to phase separate into different morphologies that can be periodic or aperiodic crystals depending on the length scales that dominate when phase separation occurs. There is considerable theoretical evidence that when there are two length scales with particular ratios, such as the Golden ratio (1.618), the resulting morphologies can be quasicrystalline (aperiodic crystals)[1]. Dodecagonal aperiodic tilings were discovered in three-component star block copolymers [2], and understanding the stability of these structures remains an open theoretical question.

In my talk, I will be discussing on how we can utilise some tricks from two wave interactions in Faraday wave experiments to predict polymer architecture that can phase separate into different structures. We will see if manipulating the structure and chemical interactions of certain block copolymers can lead to phase separation with two length scales, effectively designing polymers that will self-assemble into quasicrystalline morphologies. The aim is to make experimentally relevant predictions of which polymer architectures could lead to stable two- and three-dimensional quasicrystals or other structures.

[1] R. Lifshitz, Diamant. *Philosophical Magazine*, 2007, 87(18-21)

[2] K.Hayashida, T. Dotera, A. Takano, Y. Matsushita. *Physical Review Letters*, 2007, 98(19)

[3] M. Joseph, D.J. Read, A.M. Rucklidge, *Macromolecules* 2023, 56, 19, 7847–7859

**Venue** : Online

Zoom link: <https://icts-res-in.zoom.us/j/94954493164?pwd=K3RMSDI3Nk1qbkrjYWhBV3EyV0h4UT09>

Meeting ID: 949 5449 3164

Passcode: 030403