



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON PDE

**Asymptotics for 2D vector-valued Allen-Cahn
minimizers**

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Abstract

For the scalar two-phase Allen-Cahn equation, there is a rich literature on the celebrated De Giorgi conjecture, which reveals deep connections between diffuse interfaces and minimal surfaces. On the other hand, for three or more equally preferred phases, a vector-valued order parameter is required, and the resulting diffuse interfaces are expected to resemble weighted minimal partitions.

In this talk, I will present recent results on minimizers of a 2D Allen-Cahn system with a multi-well potential. We describe the asymptotic behavior near the junction of three phases by analyzing the blow-up limit, which is a global minimizing solution converging at infinity to a Y-shaped minimal cone. We derive sharp energy upper and lower bounds via a novel slicing argument, which allows us to localize the diffuse interface within a small neighborhood of the sharp interface. In addition, we obtain a classification of global 2D minimizers in terms of their blow-down limits at infinity. This is joint work with Nicholas Alikakos.

Date: 6 March 2026 (Friday)

Time: 9:30am

Zoom Meeting: <https://hkust.zoom.us/j/98599108529> (Passcode: 534602)

All are Welcome!