

GEOMETRIC ANALYSIS SEMINAR

“Minimal surfaces and the Allen-Cahn equation on 3-manifolds”

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Abstract: This is joint work with O. Chodosh. The Allen-Cahn equation is a semilinear PDE which is deeply linked to the theory of minimal hypersurfaces via a singular limit. Using new curvature estimates and sharp sheet separation estimates for stable Allen-Cahn solutions on 3-manifolds, derived by improving recent work of Wang-Wei, we show: minimal surfaces arising from Allen-Cahn solutions with bounded energy and bounded Morse index are two-sided and occur with multiplicity one and the expected Morse index, provided the ambient metric is generic. This confirms, in the Allen-Cahn setting, two conjectures of Marques-Neves: a strengthened multiplicity one conjecture, and the index lower bound conjecture. If combined with recent work of Guaraco and Gaspar-Guaraco, this gives a new proof of Yau's conjecture on infinitely many minimal surfaces in a 3-manifold with a generic metric (recently proven in dimensions up to 7 by Irie-Marques-Neves and later Gaspar-Guaraco) with new geometric conclusions.

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MIT, Room 2-131
Time: 4:00 PM

