CSU Condensed Matter Physics Seminar

Pattern Selection Through Directional Quenching

Arnd Scheel
University of Minnesota

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Lory Student Center room 376

Abstract

Interfaces or boundaries affect the formation of crystalline phases in sometimes quite dramatic ways. We are interested in examples where such interfaces arise through directional quenching and separate a striped phase from a uniform, non-crystalline state. Examples range from the alignment of convection roles in Benard convection to the robust patterning through presomites in limb formation, or the formation of helicoidal precipitates in recurrent precipitation. It turns out that growing the crystalline region leads to the selection of crystallographic parameters near the interface. We describe results for model problems such as Allen-Cahn, Cahn-Hilliard, and Swift-Hohenberg equations that quantify crystalline strain for small and large speeds and predict alignment parallel, perpendicular, or at oblique angles to the growth interface.