

Abstract Submitted
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Three-dimensional Icosahedral Phase Field Quasicrystal¹ PRIYA SUBRAMANIAN, University of Leeds, UK, ANDREW ARCHER, University of Loughborough, UK, EDGAR KNOBLOCH, University of California at Berkeley, ALASTAIR RUCKLIDGE, University of Leeds, UK — Complex quasiperiodic structures are observed in a variety of soft matter systems, including dendrimers and star block copolymers. We investigate the formation and stability of such quasicrystals in three dimensions using a phase field crystal model. In the model, two length scales (in the golden ratio) are selected and can be controlled independently. In addition to regular crystals, one-, two- and three-dimensional quasicrystals can be found. We compute the minima of the free energy of the competing structures to determine the phase diagram and show that the icosahedral quasicrystal can be the global minimum free energy state.* We find that strong nonlinear coupling between density waves at the two length scales is responsible for stabilizing the three-dimensional icosahedral quasicrystal.

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