Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Analysis of pattern formation in systems with competing range interactions VYACHESLAV R. MISKO, HAIJUN ZHAO, FRANCOIS M. PEETERS, University of Antwerp — Pattern formation is governed by competing interaction. Examples include: Langmuir monolayers, colloids and gels, ferrofluids, magnetic garnet thin films, type-I superconductors, the pasta phase in neutron stars, etc. We analyzed pattern formation and identified various morphologies in a system of particles interacting through a non-monotonic potential with a competing range interaction characterized by a repulsive core ($r < r_c$) and an attractive tail ($r > r_c$), using molecular-dynamics simulations [1]. Depending on parameters, the interaction potential models the inter-particle interaction in various physical systems ranging from atoms, molecules and colloids to vortices in superconductors. We constructed a "morphology diagram" in the plane "critical radius r_c − density n" and proposed a new approach to characterize the patterns. Namely, we elaborated a set of quantitative criteria in order to identify the different pattern types, using the radial distribution function (RDF), the local density function and the occupation factor. We also discuss the dynamics of the obtained patterns [2].

[1] H. J. Zhao, V. R. Misko, and F. M. Peeters, New Journal of Physics **14**, 063032 (2012).
[2] H. J. Zhao, V. R. Misko, and F. M. Peeters, submitted (2012).

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Date submitted: 20 Dec 2012 Electronic form version 1.4