

Isoperimetric problems on periodic lattices

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Motivated by the crystallization issue, we focus on the minimization of Heitman–Radin potential energies for configurations of N particles in a periodic lattice, and in particular on the connection with anisotropic isoperimetric problems in the suitably rescaled limit as $N \rightarrow \infty$. Besides identifying the asymptotic Wulff shapes through Gamma-convergence, we obtain fluctuation estimates for quasiminimizers that include the well-known $N^{3/4}$ conjecture for minimizers in planar lattices. Our technique combines the sharp quantitative Wulff inequality with a notion of quantitative closeness between discrete and continuum problems. These results have been obtained in collaborations with Marco Cicalese and Leonard Kreutz.

Primary authors: LEONARDI, Gian Paolo (University of Trento); KREUTZ, Leonard; CICALSE, Marco

Presenter: LEONARDI, Gian Paolo (University of Trento)