

Physics and Physical Oceanography Seminar

Defect interactions in athermal crystals

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DATE: Thursday, Oct 1, 2020

TIME: 3:30 – 4:30 pm

Place: Webex (link will be sent out)

ABSTRACT: Athermal jammed systems are fundamentally different from their thermal counterparts, characterized by constrained fluctuations in the positions and forces of the underlying particles. We study the effect of introducing small densities of defects into an athermal crystal, consisting of polydisperse soft particles arranged in a crystalline structure. For the case of a single defect in a perfectly ordered arrangement, we show that the microscopic equations of force balance can be solved hierarchically, yielding an exact series solution for the strain field. We show that this leads to a $1/r^d$ prediction for the excess force at large distances away from a single defect. We use this technique to study interactions between quenched defects in athermal systems and derive the emergence of power-law interactions between defects. We discuss implications for athermal crystals with low polydispersity, and verify our results with numerical simulations using soft disks interacting via linear Harmonic potentials.

ALL ARE WELCOME!