

Abstract Submitted
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Computational Physics Across the Disciplines VINCENT CRESPI,
PAUL LAMMERT, TYLER ENGSTROM, BEN OWEN, Penn State University —
In this informal talk, I will present two case studies of the unexpected convergence
of computational techniques across disciplines. First, the marriage of neutron star
astrophysics and the materials theory of the mechanical and thermal response of
crystalline solids. Although the lower reaches of a neutron star host exotic nuclear
physics, the upper few meters of the crust exist in a regime that is surprisingly
amenable to standard molecular dynamics simulation, albeit in a physical regime
of density order of magnitude of orders of magnitude different from those familiar
to most condensed matter folk. Computational results on shear strength, thermal
conductivity, and other properties here are very relevant to possible gravitational
wave signals from these sources. The second example connects not two disciplines of
computational physics, but experimental and computational physics, and *not* from
the traditional direction of computational progressively approaching experiment.
Instead, experiment is approaching computation: regular lattices of single-domain
magnetic islands whose magnetic microstates can be exhaustively enumerated by
magnetic force microscopy. Their resulting images of island magnetization patterns
look essentially like the results of Monte Carlo simulations of Ising systems... sta-
tistical physics with the microstate revealed.

Vincent Crespi
Penn State University

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