

Abstract Submitted
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Thermodynamic instability of a vacancy gas in solid Helium LODE POLLET, ETH Zurich, MASSIMO BONINSEGNI, University of Alberta, ANATOLY KUKLOV, CUNY Staten Island, NIKOLAY PROKOF'EV, BORIS SVISTUNOV, University of Massachusetts, MATTHIAS TROYER, ETH Zurich — The supersolid phase of matter, characterized by non-dissipative flow in a crystal, has been elusive for some 35 years. The recent discovery of a non-classical moment of inertia in solid ^4He by Kim and Chan has provided the first piece of experimental evidence, although its interpretation in terms of supersolidity of the ideal crystal phase remains controversial. Using Quantum Monte Carlo methods, we investigate the long-standing question of vacancy-induced superflow. We find that a uniform gas of vacancies is thermodynamically unstable against separation into two phases, an insulating, vacancy-free crystal and a liquid. We investigate the thermodynamics of other defects, such as edge dislocations.

Massimo Boninsegni
University of Alberta

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