

Abstract Submitted
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Stability limit of a metastable state of hcp solid helium-4 FABIEN SOURIS, JULES GRUCKER, JACQUES DUPONT-ROC, PHILIPPE JACQUIER, Laboratoire Kastler Brossel, ENS/CNRS/Universite Paris 6, 24 rue Lhomond, Paris 75005, France, ATOMES DANS MONOCRISTAUX TEAM — Solid helium has the unique feature of having an horizontal melting curve in the P,T plane. This offers novel opportunities to study the stability limits of a metastable solid, by using the pressure as a control parameter of the metastability. The metastable state is obtained by focusing a 1 MHz ultrasonic sound wave inside an helium-4 crystal. Around 4 bar below the melting pressure, the metastable crystal becomes unstable. Different configurations with one or two ultrasonic emitters have been used and lead to the same stability limit. This happens at much lower depression than predicted by nucleation theory or by quantum Monte Carlo simulations. Repeated experiments show that the instability initially appears as a small defect (~ 0.2 mm) located at the maximum isotropic strain. Further studies are performed to understand the underlying mechanism of the instability. Possible scenarios accounting for this unexpected observation are discussed.

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