Observation of metastable solid helium-4 below its melting pressure

J. Dupont-Roc, F. Souris, J. Grucker, and Ph. Jacquier

Laboratoire Kastler Brossel, Ecole Normale Supérieure, CNRS, Université Pierre et Marie Curie, Paris 5, France

Production and observation of metastable hcp solid helium-4 below its melting pressure is reported. Transient depressions are produced by sound wave pulses focussed inside a crystal of known orientation at 1.1 K. This is achieved with an especially designed piezo-electric transducer matching the anisotropic pressure wave surface. The density map near the focus is monitored using an optical interferometric technique. Minimum density achieved at focus corresponds to a pressure at least 2 bar below the equilibrium melting pressure. Beyond a threshold located between 2 and 3 bar below the melting pressure at 1.1 K, the crystal seems to undergo an unexpected instability.

INVITED PAPER