Migration of ^{3}He Impurities along Dislocation Lines in ^{4}He Single Crystals

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We have studied acoustic resonances in ^{4}He single crystals in the temperature region $20 < T < 300$ mK where a large softening occurs due to the unbinding of dislocations from ^{3}He impurities.[1] Here we present an analysis of the dependence of resonance frequencies on the sound amplitude, that is on the acoustic stress in the crystal. Above a threshold of order 10^{-6} bar, this stress is able to unbind dislocations from impurities which may bind again after the stress is reduced below the threshold. Our results indicate that, on a time scale of typically one hour, ^{3}He impurities diffuse along dislocations at 60 mK but not at 25 mK.

This work is supported by ERC Grant AdG247258-SUPERSOLID.

[1] X. Rojas, A. Haziot, V. Bapst, H. J. Maris, S. Balibar, PRL **105**, 145302 (2010)