Abstract Submitted
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Specific heat due to the binding of ^{3}He impurities to dislocations in solid ^{4}He[1] KINJAL DASBISWAS, DEBAJIT GOSWAMI, CHI-DEUK YOO, ALAN T. DORSEY, Department of Physics, University of Florida — A statistical lattice model is used to study the binding of ^{3}He impurities to dislocations in solid ^{4}He. By considering a chemical equilibrium between the ^{3}He atoms in the bulk and those adsorbed onto the dislocations, we are able to calculate the equilibrium thermodynamic properties of the system. The specific heat, as expected, exhibits a Schottky bump whose attributes depend on parameters like the binding energy and the concentrations of ^{3}He atoms as well as defect sites. The calculated specific heat for typical values of these parameters shows a close match with experiment [2], the peak magnitude being of the order of 10 μJ mol^{-1} K^{-1} and peak being located at around 50 mK. We show that the essential features of our model are independent of the exact lattice structure and derive an expression to estimate the shift in peak position from the binding energy value, which is an effect of the chemical potential.

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[2]X. Lin, A. C. Clark, and M. H. W. Chan, Nature **449**, 1025 (2007).

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