Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

^{4}He adsorption on a ^{3}He-plated graphite surface YONGKYUNG KWON, JEONGHWAN AHN, Konkuk University — Path-integral Monte Carlo (PIMC) calculations have been performed for ^{4}He atoms on top of the ^{3}He first layer on graphite. For this we ignore Fermi statistics of solidified ^{3}He adatoms while Bose statistics of ^{4}He atoms are fully incorporated. We first find that the first ^{3}He layer exhibits a 7/12 commensurate solid structure at the areal density of 0.111 Å^{-2}, which turns out to be identical to the experimental value for its completion density. Additional adsorption of ^{4}He atoms above the complete first ^{3}He layer is found to sustain the underlying ^{3}He commensurate structure and the second ^{4}He layer is observed to display the 4/7 commensurate structure with respect to the first-layer commensurate ^{3}He solid at the areal density of 0.0636 Å^{-2}. Furthermore, it is found that the 4/7 commensurate structure of the second-layer ^{4}He atoms can be formed above a mixture of the first-layer ^{3}He and ^{4}He atoms on graphite. These PIMC results suggest that the 4/7 commensurate structure of the second-layer ^{4}He atoms on graphite, whose existence on top of the first ^{4}He layer has long been in dispute, may be realized on a ^{3}He-plated graphite surface. This could lead to a new approach to observe two-dimensional supersolidity in ^{4}He on graphite.

Yongkyung Kwon
Konkuk University

Date submitted: 05 Nov 2015 Electronic form version 1.4