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

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