A Neutron-Diffraction Study of the Solid Layers at the Liquid Solid Boundary in 4He-Films Adsorbed on Graphite - DTU Orbit (25/12/2018)

A neutron scattering study of the structure of 4He films adsorbed on graphite is reported. Diffraction from helium monolayers at a temperature of 1.2K shows the formation of an incommensurate, triangular-lattice solid of high density. As the coverage is increased above two layers, the diffraction pattern changes indicating solidification of a second layer. The observed two-layer patterns can be indexed with either a pair of incommensurate, triangular-lattice solid layers of different densities or a close-packed bilayer; the experimental information available is not sufficient to make a more precise identification. A measurement of the height of the first helium layer above the graphite basal plane was also made. This was done by determining the coverage-dependent shift in the position of the graphite (002) diffraction peak (assumed to arise from interference between film and substrate scattering) and fitting it to a simple structural model. Values for the monolayer height above the graphite plane and for the lattice constants of the possible bilayer structures are given.

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