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Condensation of fluids adsorbed in nanopores: substrate relaxation effect HYE-YOUNG KIM, Department of Chemistry and Physics, Southeastern Louisiana University, LA 70402, SILVINA GATICA, Department of Physics and Astronomy, Howard University, Washington, DC 20059 — In recent years, both experimental and computational studies have observed that fluids adsorbed in nanopores exert a force on the substrate that produces a compression or expansion of the host. However, an overwhelming majority of the theoretical studies have assumed that the environment provides a fixed, static potential in which the adsorbate moves. In this presentation, we report recent results of a series of theoretical studies on the system of classical and quantum fluids adsorbed in slit pores and in bundles of carbon nanotubes, incorporating the substrate relaxation. We find that, in case of classical gases adsorbed in a bundle of carbon nanotubes, the bundle contracts and the critical temperature of the condensation transition increases. Slit pores contract or expand depending on the initial spacing, producing in any case an increase in the critical temperature for the condensation transition of the film adsorbed. Quantum ^{3}He in a relaxing slit pore becomes a liquid, while other two-dimensional ^{3}He (free standing or in a narrow rigid pore) are predicted to be a gas. All these observations are a consequence of a cooperative effect of the dynamic system composed of gas and non-rigid substrate.

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