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**Temperature control of colloidal phases by Critical Casimir forces – a simulation study** MINH TRIET DANG, VAN DUC NGUYEN, Van der Waals-Zeeman Institute, University of Amsterdam, Netherlands, ANA VILA VERDE, PETER BOLHUIS, Van't Hoff Institute for Molecular Science, University of Amsterdam, Netherlands, PETER SCHALL, Van der Waals-Zeeman Institute, University of Amsterdam, Netherlands, VAN DER WAALS-ZEEMAN INSTITUTE, UNIVERSITY OF AMSTERDAM, NETHERLANDS COLLABORATION, VAN'T HOFF INSTITUTE FOR MOLECULAR SCIENCE, UNIVERSITY OF AMSTERDAM, NETHERLANDS COLLABORATION — Critical Casimir forces arising from the confinement of critical solvent fluctuations between the surfaces of colloidal particles have recently been shown a promising route to control colloidal assembly. Such forces are strongly temperature dependent, and thus allow for direct temperature control of colloidal interactions. However, colloidal phase transitions controlled by this highly temperature-dependent potential are still poorly understood. Here, we report Monte Carlo simulations of critical Casimir-driven colloidal phase behavior using input potentials directly measured in experiments. We map the gas-liquid coexistence region using Gibbs ensemble simulations and the solid-fluid coexistence boundaries using Gibbs-Duhem integration, and determine the gas-liquid critical point by applying scaling theory. The constructed gas-liquid-solid phase diagram agrees quantitatively with that observed in experiments. Remarkably, the simulated gas-liquid coexistence curve exhibits 3D Ising scaling despite the strong temperature dependence of the pair potentials.

Minh Triet Dang

Van der Waals-Zeeman Institute, University of Amsterdam, Netherlands

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