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Observation of 2D Ising criticality of liquid-gas transition by the flowgram method[1] MAX YARMOLINSKY, ANATOLY KUKLOV, CSI and the Graduate Center, CUNY — We study the critical properties of the transition in 2D liquid-gas system with the square-well potential interaction by Monte Carlo simulations in the grand canonical ensemble. Due to lack of the underlying Ising symmetry, the analysis cannot be done reliably by the standard methods applicable to lattice systems. In contrast, the analysis based on the flowgram method [2] allowed us to find the critical point to significantly higher (and controllable) accuracy than in previous studies by other authors. Simulations were performed in a progression of sizes L up to size $L = 84$, with the particle numbers varying over 3 orders of magnitude and the subcritical behavior not extending beyond $L = 10 - 15$. The finite size scaling analysis of the critical exponents and their ratio, μ and γ/ν, gives values consistent with the 2D Ising universality class within 1-2% of errors. Our result essentially closes proposals that the nature of the liquid-gas transition might be different from the Ising model in systems with short-range interactions.

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[2]A. B. Kuklov, N.V. Prokof'ev, B.V. Svistunov, and M. Troyer, Ann. of Phys., **321**, 1602 (2006).

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