

Abstract Submitted
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Melting of Boltzmann particles in different 2D trapping potential DYUTI BHATTACHARYA, Indian Institute of Science Education and Research Kolkata,India, ALEXEI FILINOV, Christian-Albrechts-Universitat zu Kiel,Institut fur Theoretische Physik und Astrophysik,Kiel,Germany, AMIT GHOSAL, Indian Institute of Science Education and Research Kolkata,India, MICHAEL BONITZ, Christian-Albrechts-Universitat zu Kiel,Institut fur Theoretische Physik und Astrophysik,Kiel,Germany — We analyze the quantum melting of two dimensional Wigner solid in several confined geometries and compare them with corresponding thermal melting in a purely classical system. Our results show that the geometry play little role in deciding the crossover quantum parameter n_X , as the effects from boundary is well screened by the quantum zero point motion. The unique phase diagram in the plane of thermal and quantum fluctuations determined from independent melting criteria separates out the Wigner molecule “phase” from the classical and quantum “liquids”. An intriguing signature of weakening liquidity with increasing temperature T have been found in the extreme quantum regime (n). This crossover is associated with production of defects, just like in case of thermal melting, though the role of them in determining the mechanism of the crossover appears different. Our study will help comprehending melting in a variety of experimental realization of confined system - from quantum dots to complex plasma.

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