



THE CHINESE UNIVERSITY OF HONG KONG  
*Department of Physics*  
COLLOQUIUM

# Criticality of the Zero-temperature Jamming Transition

*by*

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*Date: December 23, 2011 (Friday)*

*Time: 4:00 - 5:00 p.m.*

*Place: L2 Science Centre, CUHK*

*(Light refreshments will be served 20 minutes prior to the colloquium.)*

ALL INTERESTED ARE WELCOME

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## Abstract

A liquid jams into an amorphous solid, e.g. glass, when it is quickly quenched or compressed. At zero temperature and shear stress, packings of frictionless spheres undergo the jamming transition at a critical-like point J in the framework of the jamming phase diagram. The criticality of Point J has been extensively studied recently.

Recent experiments and simulations have shown that in the vicinity of Point J at  $T > 0$ , the first peak of the pair distribution function exhibits a maximum at a crossover volume fraction (pressure) varying with the temperature. We find that this crossover is accompanied with apparent changes of material properties. Surprisingly, multiple quantities show critical scaling collapse, implying the criticality of Point J. Therefore, the structural signature shown at the crossover contains important physics. We also find that isostaticity still controls the flattening of the density of vibrational states, a special feature of the  $T = 0$  jamming transition, in thermal colloidal systems. We thus propose a phase diagram to state the complexity during the formation of amorphous solids such as glasses.