

Abstract Submitted  
for the MAR12 Meeting of  
The American Physical Society

**The rigidity (unjamming) transition of disordered solids is caused by non-affinity** ALESSIO ZACCONI, Cavendish Laboratory, University of Cambridge — I will present a theoretical framework which allows one to account for the non-affinity of particle displacements due to disorder within a statistical mechanical description of the elasticity of disordered solids (1). A few important results can be derived analytically from first principles for disordered harmonic packings/lattices. First of all, the theory successfully recovers the unjamming or rigidity transition  $G \sim (z-2d)$ , where  $G$  is the shear modulus and  $z$  the coordination number, in excellent quantitative agreement with the numerical simulations of Ref. (2). Secondly, the theory explains this scaling law, which was hitherto enigmatic, in terms of the competition between the elastic (bonding) energy of the solid and the non-affine relaxations which are a consequence of structural disorder and contribute a dissipative term to the free energy of the solid. Potential applications to unsolved issues related to transport and vibrational properties of disordered solids will be briefly discussed. References (1) A. Zaccone and E. Scossa-Romano, Phys. Rev. B 83, 184205 (2011) (2) C.S. O’Hern, et al. Phys. Rev. E 68, 011306 (2003).

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Date submitted: 29 Nov 2011

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